NZ Amiga MAGAZINE

Issue 1
December 1992 / January 1993
$7.95 (incl. GST)

AMIGA 1200

7 Tutorials start this month!
Chip Set Upgrades: Do you need them?
New Products: MorphPlus, CineMorph, GigaMem, ioExtender, ProWrite 3.3
Inside the Amiga 600: The new baby
Art Gallery, Book Reviews
How computers count
Who or What is Zipper?

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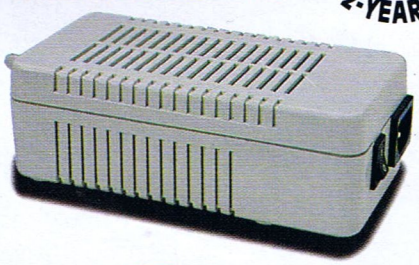

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ART GALLERY was produced by Anthony Smith from *Visual Realizations* using 3D Pro v2beta on an Amiga 2000 with 13Mb RAM, PP&S 68040, PP&S Rambrandt, GVP IV24, GVP HC8/210. Each file size 300kb, 640 x 512, 24bit, 16 million colours.
Visual Realizations **is the PP&S agents for NZ. Ph: (09) 415-8440.**
All submissions for Art Gallery considered.

NZAmiga MAGAZINE #1
December 1992
January 1993

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MANY THANKS
Jim (& JD)
for your help and support!

NZAmiga MAGAZINE was produced to film stage using the following equipment:
Amiga 3000
Amiga 2000
GVP G-Force030/40
Professional Page 3.0
Professional Draw 3.0
Art Department Pro 2.1.5
Deluxe Paint IV
Epson ES-300C scanner
Supra FaxModem V.32bis
Files were transferred via modem to a print bureau and then directly to film.

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NZAmiga Magazine is published monthly by Fromont Holdings Ltd., P.O. Box 57115, Auckland 1030.
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READ THIS!

I had to get your attention somehow, I know most of you don't read editorials because you think they are boring. I'm going to change that (I hope) by giving you something to chew on each month, and to spit back at me, too. I won't be too controversial this month because I have to do some sort of intro to NZAmiga Magazine. But lets get a debate going, send me your opinionated letters. I realise that your views are the right ones so why not let everyone else know.

One interesting comment that I heard the other day was when we were looking at some raytracing on our A3000. Somebody said "That's not real art!" and continued to expound the virtues of "real" artistic talent and how computer art was done technically and that there is no real artistic talent in it. At first I argued the opposite but then I got to thinking; "Well, I can do raytracing and produce some pretty amazing results but I'd be b.....d if I could paint or draw the same thing." So, maybe they are right, "real" art is a bit harder than clicking on a few icons and pressing the return key. ?

Well, on with the intro: Welcome to the first issue of **NZ Amiga magazine**. We will be publishing every 2 months until we get established and can publish monthly. This depends on sales so subscribe now. We want to keep the *Amiga* alive in NZ and I'm sure that you do too. This is your magazine, please support it.

As you will notice we will have regular articles/tutorials on certain subjects, such as music, graphics, technical, beginners, assembler, Blitz Basic 2, etc. We will also do reviews on products but only those that are available locally. Features are the other category of our articles. These are one-off articles on a topical subject, such as the *A4000* article. We have very competent writers organised to write these article but we are always looking for new talent.

In our regular subject departments we still need writers for education, DTP, Arexx, AMOS, C, multimedia, printers, PD. We are also interested in ideas for other regular articles. We want articles that are just one-offs, too. If you are involved in an area that you think would be of interest to more than just yourself then let us know about it.

User Groups and Bulletin Boards! We would like to print you details free! But we can't unless you send us some information. Please do so as soon as you can and we will try to get it in the next issue.

We will not be doing games reviews initially and may not ever do them at all. This will depend on what you, the readers, want and whether any of the games importers will give us games to review. We will be having a monthly page or two on hints and tips, so write to us and let us know what you want to know about games. Even if you have questions about which is the best adventure game to buy etc. then if we get enough letters about it we might do an article about it. Tell us what you want to see.

We want to provide the latest information about *Amiga* from NZ and overseas. We will also review *Amiga* products but only if they are available in NZ. Our reviews will depend on distributors and agents contacting us so that we will be aware of products available. Of course, we will also need to borrow some of them to do reviews. This is going to advantage local distributors and of course our readers who will then know where to buy the products.

This magazine will be read by a large number of *Amiga* users each month. They are all looking for new products and services and would like to know what they can get here or will have to buy from overseas instead. So if you are a distributor or retailer of *Amiga* products we believe that it will be to your advantage to advertise in **NZ Amiga Magazine**. We are also interested in reviewing the products that you supply, in stand alone reviews and comparison reviews. See page 54 for advertising and product return form.

If you have any information about the *Amiga* or related products then let us know. We have many good sources of information but we are especially interested in the NZ scene. You can help! Generally we will not publish your name or details but if you want us to, indicate this in your letter.

We also want letters to the magazine! **NZAM** is your magazine but we don't know what to print if you don't tell us what you want to see. Each month we will have a readers letters' section. The letters can be directed to us about the magazine itself or topics you would like to see covered. They can be general questions to our readers to see if someone knows the answer to a particular question. They can be comments or opinions. They can be information that you have discovered and think might be interesting to other readers. Whatever it is, load up your word processor and get typing. Anything bigger than half a page we would prefer an ASCII file as well as a letter. We just don't have the time to retype everything into our system.

What do you think of our first issue? Unless you tell us whether it is good, bad or mediocre then we are not going to be able to improve. We are not afraid of criticism (we just don't like it) but we shine with praise. Just kidding, but do write to us. Take a look at page 54 for more details. - *G.C.*

New Products

by Jim Hilton

TRUEPRINT/24

ASDG, the well-respected company from USA has just released a couple of new products, again proving themselves a leader in the never ending race to take the *Amiga* into the professional zone of computer brilliance.

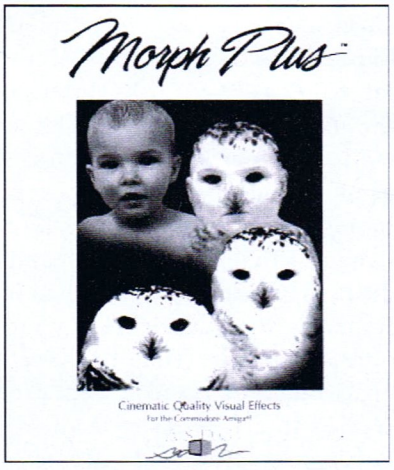
TruePrint/24 puts high quality colour and gray scale printing in reach of all *Amiga* owners. This is a stand alone utility which outputs 24 bit-plane colour or 8 bit-plane gray scale images on *Preferences* supported printers. *TP/24* can output prints of any size, from single pages to outdoor signs. *ASDG* even states you can print graphics on non-graphics printers such as daisy wheels. They state this means you can produce stunning prints with 16 million colours (24 bit-planes) on most *Preferences* supported colour printers without the need for custom drivers. *TP/24* can also print 256 shades of gray on black and white devices such as laser printers. *TP/24* provides 11 dithering and halftoning techniques, including traditional as well as artistic methods. They even manage printing images with 32 shades of gray in character- only devices such as daisy wheels. *TP/24* is compatible with *Kickstart 1.3* and *2.X*. Remember this is a stand-alone utility and does not require *Art Department Professional*. Suggested retail of $195.00, *ASDG Incorporated*.

MORPHPLUS

Morphing: The latest trend in image processing and who else but ASDG *to lead the way.* Morphplus *is a cinematic quality visual effects package which runs stand-alone or can be used through* Art Department Professional Version 2.

Morphplus *is the first* Amiga*-based morphing product to actually be used in an on-going basis in Hollywood for the production of major television and motion picture projects according to Daniel Esenther, Vice-President of* ASDG. *Why was it picked?, is because they believe* MorphPlus *is faster, easier to use, more flexible and produces better results.*

Want to turn your A2000 *into an* A4000 *or just turn an image of your girlfriend or boyfriend into a real glamour model (only on the screen, sorry) then get into* MorphPlus. *Besides morphing the program includes other high quality WYSIWYG effects, such as ripple and wave modeling. DVE (Digital Video Effects) can map a picture onto a tumbling sheet. You can apply the spherical scaling module, where you control every aspect of the transformation including the amount of distortion and placement on the sphere. You can even map images onto a rotating sphere, giving you a world of possibilities.*



Using the twirling or rotation module, you can twirl or rotate about any point by any amount. You can specify any radius to effect only the local area or the entire image, and optional soft edges and anti-aliasing ensure the smoothest possible results.

MorphPlus *also reads and writes anim files, and can use* Art Department Professional*'s scanner, film recorder and format expansion modules. It*

comes with FRED, *an animation assembler/editor/batch processing program to help combine your effects into professional quality sequences.*

As ASDG *state, use* MorphPlus, *your* Amiga and *your imagination to achieve the same quality of special effects that appear every day on movie and television screens around the world. Suggested retail of $625.00,* ASDG Incorporated

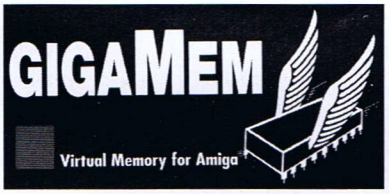
PROFESSIONAL DRAW 3.0

Most of you will have heard of this upgrade by now, but here is some details of one the *Amiga's* most popular structured drawing package, very popular with desktop publishing users. This time *Gold Disk* have incorporated the famous *Genie* button, similar to *Pro Page 3.0.* Unleash the *Genie* and you can automatically perform tasks that used to be difficult or even impossible, says *Gold Disk.* Create complex objects and designs, then use Step and Repeat to duplicate your object multiple times in specific increments. You can use *Genies* to create Avery Labels, Polygons, Rounded Rectangles, Select by Attribute, Copy Object Attributes, Scale to fit, Convert to Grey Scale, Plot Polar, Plot Functions, Create Mandelas and many more.

With their new Hotlinking (sounds familiar) system you can instantly take a clip to *Professional Draw 3.0* from *Professional Page 3.0,* edit it, and send it right back, no need for re-importing. You can link from *Art Department Professional* to instantly edit and return bit mapped photos or paintings you've placed in *Professional Draw.* They hint at more links on the way or you can create your own links using *ARexx.* Here are some other features mentioned, import 24-bit IFF images and combine photographic quality bit mapped images into your illustration. Rotate, Crop and Scale IFF and EPS images, giving total design freedom over your imported images. Auto-Tiling, where you can easily print pages larger than your printer allows. Landscape printing for Dot Matrix and LaserJets/DeskJets. Special positioning Controls for LaserJets and DeskJets. Suggested retail of $450.00, *Gold Disk.*

GIGAMEM

GigaMem *is a program which simulates up to 1Gb of memory, which it swaps onto any mass storage system (i.e., hardisk). Intelligent management accomplishes simultaneous use of several programs in multi-tasking mode.*



Now this is where the wealthy 68030MMU owners take over (and don't we all have a spare 1Gigabyte on our hard drives), no you don't need 1Gb, it will use what ever you allow for graphics, music, animations, DTP, scanning, ray tracing. Features include swapping to either a file or a partition, intelligent memory swapping in accordance with memory access frequency, use of Amiga DOS 2.X *style, full multi-tasking, no slow down during disk access, intelligent paging strategy as in UNIX, display of available virtual memory on the* Workbench *title, and more.* GigaMem *works with any* Amiga *computer with MMU and is compatible with* Kickstart 1.2, 1.3 *and* 2.X. *Suggested Retail of $350.00,* INOVAtronics.

VECTOR

Interactive Video Systems have finally released *Vector* a new third generation 68030 processor accelerator board for the *A2000* (third generation, does that mean my 030 is that old?). *IVS* says, *Vector* is the most versatile accelerator board available, due to its high performance features. Based on *Motorola's* 68EC030 or 68030 CPU its clever design allows *Amiga's* 16-Bit *Kickstart* ROM to be remapped into *Vectors* 32bit RAM, thus alleviating the most common use of a MMU on an *Amiga* system. The CPU is socketed so users can replace the EC030 with a full 68030 if desired. Clock speeds range from 20 to 40 MHZ, Vector will operate at any frequency between 20 and 40MHz to accommodate users with special needs. The socketing of both 030 and 68882 math co-processor ensures that it can be upgraded to faster speeds as technology increases. Vector can be expanded with on-board RAM in increments of 4, 8, 16 and 32 megabytes using industry standard 1x8 or 4x8 SIMM modules. *IVS* justifies the use of industry standard SIMMs rather than 32-bit SIMMs as standard SIMMs are used

worldwide on *Amiga*, *Mac* and DOS systems. Standard SIMMs also avoid the extremely inflated price of custom 32-bit SIMMs. No sacrifice in speed or performance using standard SIMM modules ensures that customers will always be able to upgrade RAM on *Vector* and not be forced to purchase RAM from one manufacturer only. *Vector* has a high speed SCSI controller, the same high-speed controller used on the *Grandslam* board and the *Trumpcard Pro*, which is extremely important for high sustained transfer rate to maximize the impact of your presentation. The *Vector* also allows adding additional SCSI devices and the Exclusive SCSI-Share Networking facility with a transfer rate of over 20Mbits/sec. *IVS* promotes the third generation feature as *Pro-PLEX*, state of the art technology. *Pro-PLEX* gives the 68000 processor accessibility of the RAM and SCSI controller on the *Vector* when the 68030 is disabled. Other manufacturers' designs of accelerators force you to purchase a separate SCSI controller and RAM board to use your 68000 applications. If users need more than 32 megabytes of RAM, *Vector* includes a fully compatible 2630 expansion bus. This allows products such as *DKB's 2632* memory expansion board to connect directly to the Vector, adding up to 112 megabytes of 32 bit RAM to the system. In such a configuration, *Vector* has the capacity to expand to a whooping 144 megabytes of RAM. Suggested retail of $1700.00 (with 0 RAM), $1950.00 (4Mb RAM) & $2500.00 (16Mb RAM), *Interactive Video Systems.*

A-Max II Plus

Readysoft *has finally released the* A-Max II Plus Macintosh *emulator for the* A2000, A3000 *and* A3000T *(and I assume the* A4000*?), this provides a higher level of hardware and software compatibility than ever was thought possible. But don't you* A-Max II *owners get too discouraged with the new software, version 2.5 is well-worth upgrading to. The* A-Max II Plus *is a* Zorro II *card and supports only 128K* Macintosh *ROMs. The ROMs are not included and must be purchased separately and are not as hard to obtain as they used to be. Additionally, the screen emulation is only black and white, (*Readysoft *states that colour is the biggest request but they have no immediate plans for adding this feature). Once you install the ROMs you will find that your Amiga runs* Macintosh *software flawlessly. The* A-Max II Plus *can also use all the* Amiga's *resources such as RAM, hard drive and one distinct improvement over the* A-Max II *is the ability to utilize the existing* Amiga *floppy drives to read* Macintosh *disks directly, thus doing away with the cost of purchasing an expensive* Mac *drive.*

Also on the A-Max II Plus *card is full MIDI emulation,* Macintosh Localtalk, *a* Macintosh *serial and parallel ports.*

Unfortunately with all that is supplied, you will have to provide the Macintosh *operating system, either* System 6 *or* System 7. *The installation is an absolute breeze and once installed the software starts with a complex choice of set-ups and once set away it goes. Within a few seconds a "*Welcome to Macintosh" *sign appears. Then off you go into the* Macintosh *world and don't forget the* ***Eject*** *button for the* Macintosh *floppy system, if you do forget and eject a disk like you would on the* Amiga, *you will face a screen reminder to replace the disk and press the eject button (strange people these* Mac's*). If you wish, and your hard drive is recognized by the* A-Max *system (most are, but not all), you can set a partition on your hard drive for all your* Macintosh *programs. The system is quite at home with 68000, 68030 and 68040 processors and will surprise your* Mac *mates at the speed it will work. Most* Macintosh *productivity software runs extremely well and I even read how one can use the system to read* Macintosh *CD-ROM's with the combination of the* Xetec *CD-ROM and the* Macintosh *driver, couple this with some of the powerful* Mac *DTP utilities, fonts and clip art on CD-ROM and you have one powerful system. Suggested Retail $1090.00,* ReadySoft, Inc.

ESSENCE

Another of the many utilities being produced to enhance and improve the power and flexibility of *Imagine*, the popular 3D modeling package. This product is produced by *Apex Software* from USA. It is a set of over 65 new algorithmic textures which greatly enhance the capabilities of *Imagine*. The textures are not a collection of pictures, like numerous packages currently available.

They go beyond the capabilities of brush maps by instructing *Imagine* to mathematically shade every point on an object as an actual solid 3D texture. The textures are fully 3D, not just a flat 2D image wrapped onto an object, they can be fully animated (imagine realistic swirls and eddies). They provide finer detail than any type of brushmap and only require about 5-20kb of memory. *Apex* state that *Essence* is destined to become an essential extension of *Imagine*. It will save hours of drawing time, improve the appearance of object surfaces and conserve memory." Some of the 65 textures include:

Altitude Textures: Raised square mesh, Raised hexagon mesh, Diamonddeck nonslip studs, Fractal bumps (for everything from asteroids to concrete), Flatten (cartoon shading)

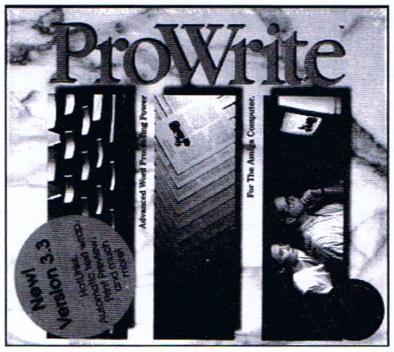
Fractal Noise: Turbulent or smooth, 1, 2 and 4 colour conversions, over 20 variations, fully animated for swirling clouds or smoke.

Miscellaneous: Mandelbrot (infinite detail), Marble, Polkadots, Fractal tree bark, Spirals and swirls (Fractal versions, too)

Transitions: Linear, band, cylindrical, ring, spherical, shell. Smooth or fractally turbulent versions (animated)

Tilings: Hexagons, Floortile, Stripes, Triangles.

The textures were designed and written by award-winning *Amiga* artist Steven Worley, assisted by Glenn Lewis. Suggested Retail $175.00, *Apex Software*.



PROWRITE 3.3

New Horizons *have just released* Version 3.3 *of* ProWrite, *which they state gives you more power than ever before. It is designed with more powerful graphic handling, including automatic text-wrap, print preview and password protection for all your documents. The ability to name and find pictures in long documents. Full clipboard support, for seamless exchange of text and pictures with other programs. This upgrade of* ProWrite *comes with* HotLinks *support, giving you total integration of* ProWrite *with other* HotLinks *capable programs. Also included are features like multiple fonts and pictures, a spelling checker with over 100,000 dictionary words. A thesaurus with over 300,000 cross-references. Outline font support. Jaggie-free printing. Macros and* ARexx *support. Mail merge, for form letters and multiple columns, including side-by-side columns for writing audio/video scripts - a* ProWrite *exclusive. Full support for* Kickstart 2.0, *it requires* Kickstart 1.2 *or later, one megabyte of memory, and two disk drives. Suggested Retail $225.00,* New Horizons.

ART EXPRESSION

Okay all you *PageStream* freaks, here is what you've been waiting for. Your very own structured drawing program. *Soft-Logik Publishing* are proud to state that *Art Expression* is the most powerful drawing program ever designed for the Amiga (such modesty). It allows you to warp and distort text like never before. You can run text around a curve, warp it inside shapes and edit it in any way. *Art Expression* even has color blend and shape metamorphosis. It also boasts features like Rotate, Skew, Blend, Stretch, Fill and Edit. Change colors, edit character shapes, create transparent holes and transform objects. *Art Expression* can use *PostScript Type 1* fonts and you can load and edit IFF DR2D, *Aegis* and *Adobe Illustrator* files and also save in DR2D or *PostScript* for use in *PageStream*, *Sign Engine*, *ProVector* and other programs. With *Art Expression* you also get BME trace and 35 *PostScript* fonts and two illustrated manuals with a "cookbook" of examples, plus when you register you will receive a disk of more free *PostScript* fonts and clip art. Suggested Retail $549.00, *Soft-Logik Publishing*.

CINEMORPH

Great Valley Products *has released* CineMorph, *probably the easiest to use morphing package available for the* Amiga. *It doesn't lack features though and has a few sample morphs to introduce you to the more complicated aspects of morphing. Features listed for* CineMorph *are ease of use, static or full motion morphing, single image morphing, group or individual point control, multispeed morphing, 2 morph methods, generate and automate animations, intuition-based image windows. Directly renders to Amiga formats, HAM-E, DCTV, as well as 24-bit IFF. There is an FPU version provided for a dramatic speed increase. Suggested retail $299.00,* Great Valley Products, Inc.

ioEXTENDER

GVP have also introduced the *ioExtender* card for the *A2000/A3000*. It is a long awaited product and will prove indispensable to many users. It is fitted with 2 serial, 1 parallel and 1 MIDI port. The card uses one Zorro slot and the optional second serial and the MIDI port occupies an adjacent slot cover.

The serial ports are 9-pin male RS-232 PC-style connectors and have a 16 byte buffer (2 byte on standard Amiga serial ports) which means high transfer rates. The parallel port can be configured as either *Amiga* or *PC*. The MIDI port is a 9-pin female connector and in early 1993 the optional *MIDI Expansion* box with *Rack Mounting Kit* for 2 complete 16 channel MIDI busses, plus each bus has 1 IN, 3 OUT and 1 THRU 5-pin DIN jacks. Software provided lets you assign your software and hardware to the different ports. You can even change the Amiga's default ports to the *ioExtender* card ports. The software also lets you set the baud rate and input buffer size for the serial ports.

Of course multiple boards can be installed and you only need to use your imagination to realise the versatility of the *ioExtender.* Sugested retail $599.00, *Great Valley Products, Inc.*

MBX 1200

Floating point and 32-bit wide memory expansion for the new Amiga 1200. *Well before we have even seen the new Amiga 1200* Microbotics *is offering the* Microbotics MBX 1200 *to* Amiga 1200 *owners as a cost-effective, high-quality upgrade solution to provide a* Motorola 68881/68882 Floating Point Unit (FPU). *To support the installation of up to eight megabytes of 32-bit wide* Amiga Fast RAM *the* MBX 1200 *board installs internally on the* Amiga 1200*'s standard 150 pin bus expansion connector,* MBX 1200 *(with standard 14MHz math chip installed) speeds-up floating point operations by as much as 55 times that of the native* A1200.

Adding 32-bit wide Fast RAM to the MBX 1200 *boosts general operating speed of the system by more than 75%. With the FPU and* Fast RAM *installed, the average of all the tests in the* AIBB Benchmark *is more than eight times the speed average of a native* A1200. *The* MBX 1200 *permits the* A1200 *user to realize the full potential of his system and software.*

MBX 1200 *Specifications: FPU* Motorola *68881 (or 68882) math chip, PGA (Pin-Grid Array) component. CPU clock speeds supported: 16MHz 68881 installed as standard, clocked at 14.3MHz, field upgradeable to up to 50MHz 68882. Installation: Internal to* Amiga 1200, *resides on the 150-pin card edge connector. User or dealer installable. Designed for general compatibility with all* Amiga *system software, including* AmigaDOS 3.0 *and later versions.*

Supports the addition of optional 1, 2, 4 or 8 megabyte, 32-bit wide SIMM (Single Inline Memory Module) RAM that operates with zero wait-states for maximum system speed. Memory SIMM Types: 72-pin "wide-body" SIMM organised N-megabytes x 32 bits, for example, Micron MT8D25632 *(one megabyte),* MT16D51232 *(two megabytes),* MT8D132 *(four megabytes), and* MT16D232 *(eight megabytes). SIMM socket is first-quality, professional metal-latch type for ease of insertion and secure contact. System Compatibility and Mapping: RAM is auto-configured under* AmigaDOS 3.0, *which can be withheld from the free memory list (for test purposes) via a jumper. Math chip can operate without installed memory.*

Continued on page 35

Amiga Tek: The Next Generation

by Nick Divehall

The release of the *Amiga 4000* at the World of Commodore Show in Pasadena, California, signifies the most important technological advancement for the *Amiga* since the release of the *Amiga 1000* in 1985. For over a year there have been some rumours and much speculation over *Commodores* introduction of a completely new custom graphics chip set for the *Amiga*. With the introduction of the *A4000* rumour has become reality.

Glorious Graphics!

The *A4000* is the first in a line of new *Amigas* to incorporate *Commodores* new Advanced Graphics Architecture (AGA) custom co-processor chip set. With the 24-bit palette of the AGA chip set you have 16,777,216 colours to choose from instead of 4096 colour palette of the old chip set. You can use these new chips to display and animate graphics using up to 256,000 colours at once, in any resolution ranging from 320x256 to 1280x1024 plus over-scan!

The *Agnus* and *Denise* chips that used to be responsible for handling the *Amiga*'s graphics have been replaced with the *Alice* and *Lisa* chips. These two chips are essentially what makes up the AGA chip set. Together these chips provide faster graphics handling than their predecessors giving the AGA chip set better video performance than a 386 based PC.

With the AGA chip set, the problem of interlace flicker has been eliminated without the need for display enhancers, or flicker fixers. With the AGA chip set, and providing you have a multi-sync monitor, you can display any screen flicker-free without additional hardware.

Motorolling Along

The *Amiga 4000* is based around the *Motorola* 25Mhz 68040 processor and incorporates full 32-bit architecture. The 68040 is the fastest commercial *Motorola* 68000-series chip available and is capable of executing over 20 Million Instructions Per Second (20 MIPS). The CPU is not on the motherboard but on a removable module that plugs into a 200 pin processor slot. This type of configuration indicates that we are likely to see other machines based around *A4000* chassis and motherboard but with a different processor. It also means that future *Motorola* processors such as the 68050 or 68060 can easily be fitted. The *Amiga 4000* comes standard with 2 megabytes of chip RAM and 4 megabytes of fast RAM, which can be expanded to 16 megabytes using standard SIMM memory cards. With the massive address space of the 68040 it is possible to expand the *A4000* to 1.7 Gigabytes of RAM! Like the *Amiga 600* there is extensive use of Surface Mount Technology in the construction of the motherboard making the *A4000* extremely reliable.

Unlike its predecessor the *Amiga 3000* which uses a SCSI hard drive, the *A4000* is supplied with an IDE 120 megabyte hard drive. This change is due to the small percentage of *Amiga* users that use SCSI devices other than hard drives. If you want to use SCSI devices such as tape backup systems, floptical drives and other such devices you will need the *A3090* (as fitted to the *A3000*) which is an optional 32-bit SCSI-II controller which will be available for the *Amiga 4000* along with other peripherals about March 1993. The high density floppy drive supplied can read and write 1.76Mb and standard 880k floppy disks. Using the *CrossDOS* program supplied with *AmigaDOS 3.0*

the *A4000* can also read, write, and format *MS-DOS* 1.44Mb and 720k floppy disks.

Similar to the *A3000* the expansion slots are mounted sideways. This allows a low profile case design that is slightly larger than the *A3000* but smaller than the *A2000*. There are four 16/32-bit *Zorro III* slots, three 16-bit PC AT slots, and a 24-bit video slot. As the 24-bit video slot is in line with a *Zorro III* slot as on the *A3000*, this should see the development of new video cards, such as genlocks and frame grabbers, that will take advantage of the new AGA chip set. The case of the *A4000* can accommodate two internal hard drives, 2 internal floppy drives and has a 5.25 inch bay for devices such as a removable hard drives, CD ROM drives, tape backup devices, etc.

Of all the changes made to the *Amiga* custom chip set over the past few years, the one chip that has remained unchanged since the *Amiga 1000* is the *Paula* chip, which is responsible for the *Amiga*'s stereo sound. With 8-bit 4 channel sound it is disappointing that no *Paula* upgrade was incorporated into the *A4000*. However, to keep complete compatibility, the original *Paula* chip had to be used. Do not despair, Digital Sound Processing (DSP) is to the rescue! Motorola's DSP chip can act as a 16-bit high speed sound card, sampler, and more! When coupled with the CPU and AGA chip set it is likely to be the key to real time 3-D rendering. This chip is effectively the replacement for the *Paula* chip. Unfortunately it is not standard on the *Amiga 4000* but will soon be available as a separate card.

Workbench Release 3.0

To accommodate the new technology of the AGA chip set, the *Workbench* and *Kickstart* have been adjusted accordingly with the release of *AmigaDOS 3.0*. *AmigaDOS 3.0* is essentially the same as the beta release of *AmigaDOS 2.1*, except that it is designed to take full advantage of the AGA chip set. At the heart of *AmigaDOS 3.0* is a 32-bit *KickStart* ROM to accommodate the full 32-bit architecture of the new machines.

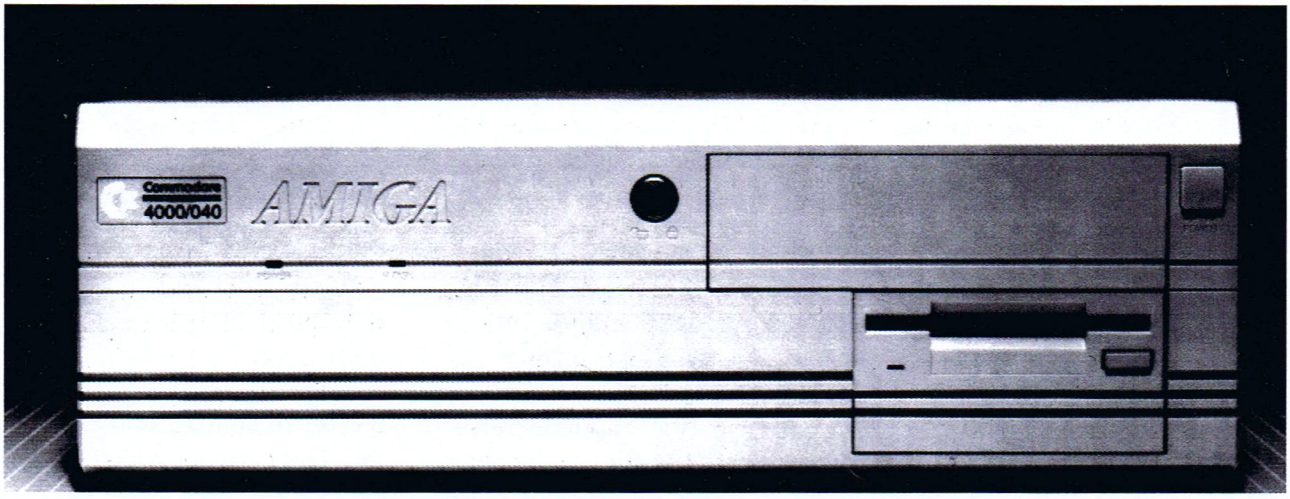
AmigaDOS 3.0 allows *Amiga*'s with the AGA chip set to display 256 colour *Workbench* screens. It also permits independent palette settings for different windows on your *WorkBench*. This enables you to display simultaneously a number of different windows containing graphics or animations.

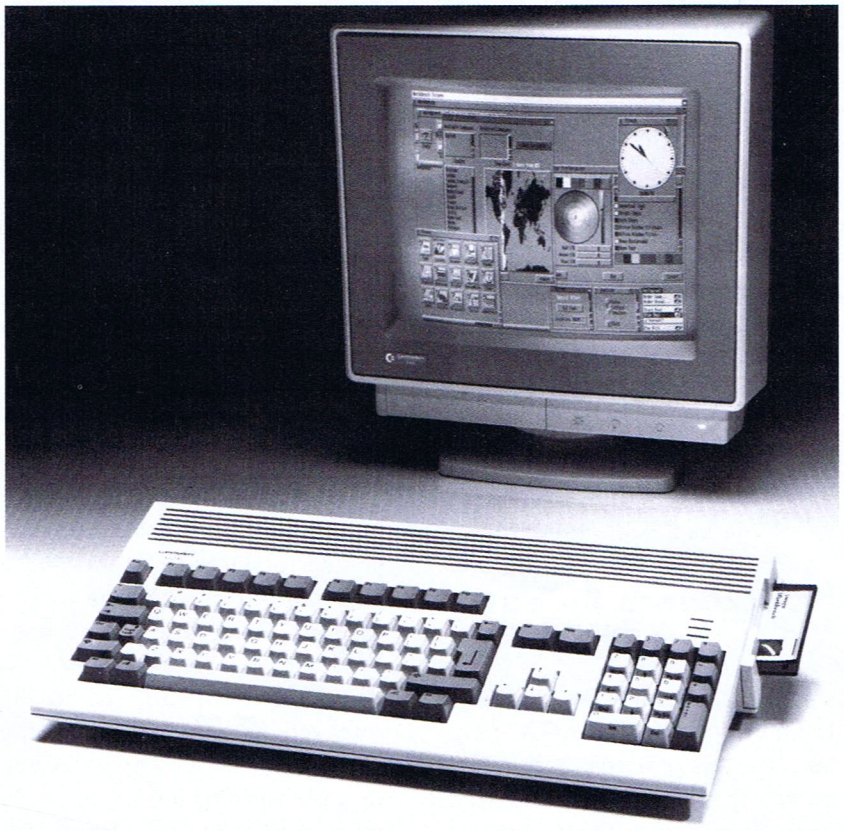
Like *AmigaDOS 2.1* you have the ability to read and write MS-DOS devices such as floppy disks and hard drives. The *Preferences* have had new options added. These include a sound facility to add samples to different events in the *Workbench*, full support for postscript laser printers, and a *Locale* option to change to any foreign language for your requesters.

AmigaDOS 3.0 is to be released as standard with the AGA chip set machines. Even though *AmigaDOS 2.1* is ready to be released it is likely we will see a jump from *AmigaDOS 2.05* to *AmigaDOS 3.0*. Either way *AmigaDOS 2.1* or *3.0* will be extended and adds to the powerful features of *AmigaDOS*.

Advanced Graphics Architecture

The new Advanced Graphics Architecture was rumoured to be named the AA chip set, but has been officially termed





the AGA chip set. This AGA chip set has been designed to give the *Amiga* incredible graphics potential while still keeping complete compatibility with the original chip set.

The biggest advantage with the AGA chip set is its increased number of bit planes allowing more colours on screen. With the AGA chip set you can display 256 colours, out of a palette of 16.8 million, on the screen at once in any screen mode. Also a new HAM (Hold And Modify) mode called HAM8 is available, this allows you to display 256,000 colours on the screen simultaneously in any screen mode unlike the standard HAM mode on the older machines. This gives the AGA chip set graphics quality to rival the 24-bit display cards available for the *A2000* and *A3000*.

The graphics handling of the AGA chip set has been sped up considerably with a full 32-bit wide data bus, and along with fast page mode RAM the bandwidth has been increased fourfold. All this means that graphics will move faster than ever before.

The AGA chip set also improves the performance of sprites. Sprites are graphical objects that move independently from the background graphics, like your mouse pointer for instance. The AGA chip set allows up to 8 sprites either 16, 32, or 64 bits wide. Sprites can also have resolutions independent from the screen. This means goodbye to that chunky looking mouse pointer, and hello to faster, slicker games' graphics!

One of the most important upgrades to the chip set is an end to interlace flicker. While interlace is great if you use the *Amiga* for video, if you are trying to do anything else, interlace is nothing more than irritating. Now all resolutions are interlace free so long as you have a VGA or multisync monitor. The AGA chip set can display horizontal frequencies from 15kHz to 31kHz, vertical frequencies of 50Hz to 72Hz, and like the ECS chip set it can be set by the software to PAL or NTSC screen modes.

The AGA chip set is compatible with previous software but incompatible with previous hardware. Because of the AGA chip sets radical new design it makes it almost technically impossible to upgrade an existing machine. For a start, the AGA chip set has a 32-bit wide data bus which means that the only existing *Amiga* that is technically possible to upgrade is the *Amiga 3000* and the release of such an upgrade is highly unlikely.

The Amiga 1200

The *Amiga 1200* will follow up the introduction of the *A4000* with its release in the beginning of 1993. With the *A1200*'s integrated keyboard it is aimed at the same market as the *A500* and *600*. Like the *Amiga 4000*, the *A1200* will incorporate the new AGA chip set along with a 32-bit processor, 2 megabytes of chip RAM and *Amiga DOS 3.0*. The *A1200* has full 32-bit architecture with 32-bit ROM and RAM, and runs a 14 MHz 32-bit *Motorola* 68E020 processor. This processor runs at twice the clock speed of the standard *Motorola* 68000 and along with a 256 byte instruction cache and 32-bit operation, it achieves performance 5 times that of the *Amiga 500 / 600 / 2000*.

The case design of the *A1200* is similar in styling to the *A600* except that it has a

numeric keypad like the *A500*. The *A1200* also supports the addition of an internal IDE 2.5" hard drive. Expansion is possible through a PCMCIA slot located on the side of the unit and a 32-bit processor bus in a trap door in the bottom of the unit. This trap door expansion port is similar to the port found on the *A600* but is enhanced to the 32-bit 14 MHz specifications the 68E020 processor. Devices added to the processor bus can be attached via a external cable through a rear knock out panel as well. Cards and adaptors for these ports will allow the addition of DSP processors, Fast RAM expansion, PC AT emulators, SCSI adaptors, and accelerators cards.

No doubt we will see the *Amiga 1200* become the *Amiga 500* of the 90's.

What will happen to the Amiga 2000?

The replacement for the *A2000* will be based around the *A4000* motherboard and casing but with a different processor module. This will be called the *A4000/030* and will have a 25 MHz *Motorola* 68030 CPU.

The release of the *A4000/030* will probably be within the first half of 1993. We will keep you updated as the details are finalised.

As the *A2000* is the only *Amiga* that the Video Toaster fits into properly, it is unlikely we will see it go out of production immediately.

Opinion

The introduction of the *A4000* marks the advent of a much needed upgrade to the *Amiga*'s custom chip set. With the AGA chip set's large palette, high speed, high resolution graphics and the end of interlace flicker, it puts the *Amiga* again at the forefront of computer graphics technology.

There is no doubt that the *A4000* and the other AGA chip set machines will make the *Amiga* more popular than ever. I don't know why *Commodore* has waited so long to introduce the AGA chip set. It would have made sense to incorporate the AGA chip set into the *Amiga 3000*.

Summing up

The *Amiga 4000* will be released in New Zealand around Christmas. We will give you a hands-on review of the *A4000* and *Workbench 3*, and hopefully the *A1200*, in our next issue. Both the *A4000* and *A1200* will most likely be available beofre our next issue in Feburary, stay in touch with your dealer.

The release of the *A4000* is to be followed up with the release of other AGA chip set based machines. The *A1200* should be introduced soon after the *A4000*. About mid-1993 we should see the release of the *A4000T*.

Because of the imminent release of these new machines it means that the prices of the *A2000*, and *A3000* have fallen considerably, it is a good time to make that upgrade you have been putting off.

The introduction of the *A4000* marks the end of an era with the *A500*, *A2000*, and *A3000* in the process of being phased out of production, however it also marks the beginning of a new generation; to boldly go where no computer has gone before!

NEXT ISSUE: We test drive the A4000, Workbench 3.0 and the A1200!

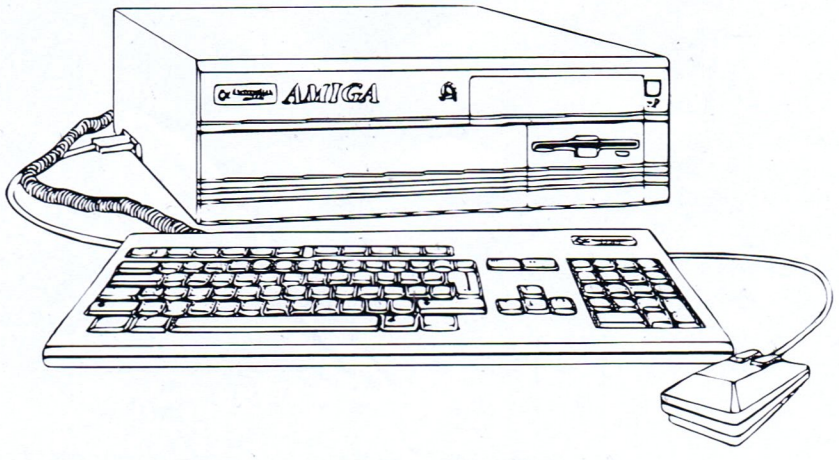
AMIGA 4000'S VITAL STATISTICS

CPU

Motorola 68040 32-bit processor
25MHz clock speed
Removable processor module

MEMORY

2 megabytes 32-bit Chip RAM



4 megabytes 32-bit Fast RAM expandable to 16 megabytes on motherboard via SIMMs

Using the Amiga's proprietary Autoconfig capability RAM can access a maximum of 1.7 Gigabytes

GRAPHICS MODES

Advanced Graphics Architecture (AGA) custom co-processor chip set

24-bit colour palette of 16.8 million colours

2 - 256,000 definable colours displayable on screen

Resolutions ranging from 320x256 to 1280x1024 plus over-scan (non-interlaced)

NTSC, PAL and HDTV Video compatible

VIDEO DISPLAY OUTPUT

Supports RGB, VGA and multisync monitors

Horizontal scan rates 15kHz - 31kHz

Vertical scan rates 50/60Hz - 72Hz

SOUND

Four channel stereo sound

8-bit Digital to Analogue converters

6-bit volume

DISK DRIVES

3.5 inch high density disk drive 1.76Mb/880k formatted capacity

120 megabyte IDE hard drive

2 rear and 2 front 3.5 inch bays

1 front 5.25 inch bay

INTERFACES

Keyboard

2 x Mouse / Joystick / Lightpen / TrackBall / Tablet ports

RS-232 Serial port

Parallel (Centronics) port

Video (RGB analog or RGBI digital)

RCA right and left Audio

2 x internal floppy disk drive, 1 x external floppy disk drive

1 x internal IDE port

SYSTEM SLOTS

CPU slot 200 pin supports high speed memory and advanced processors

4 x Zorro III 32/16 bit 100 pin expansion slots

3 x PC AT 16-bit slots

1 x 24-bit Video Slot

OPERATING SYSTEM

AmigaDOS 3.0 Multi tasking Operating System

512K 32 bit KickStart ROM

MISCELLANEOUS

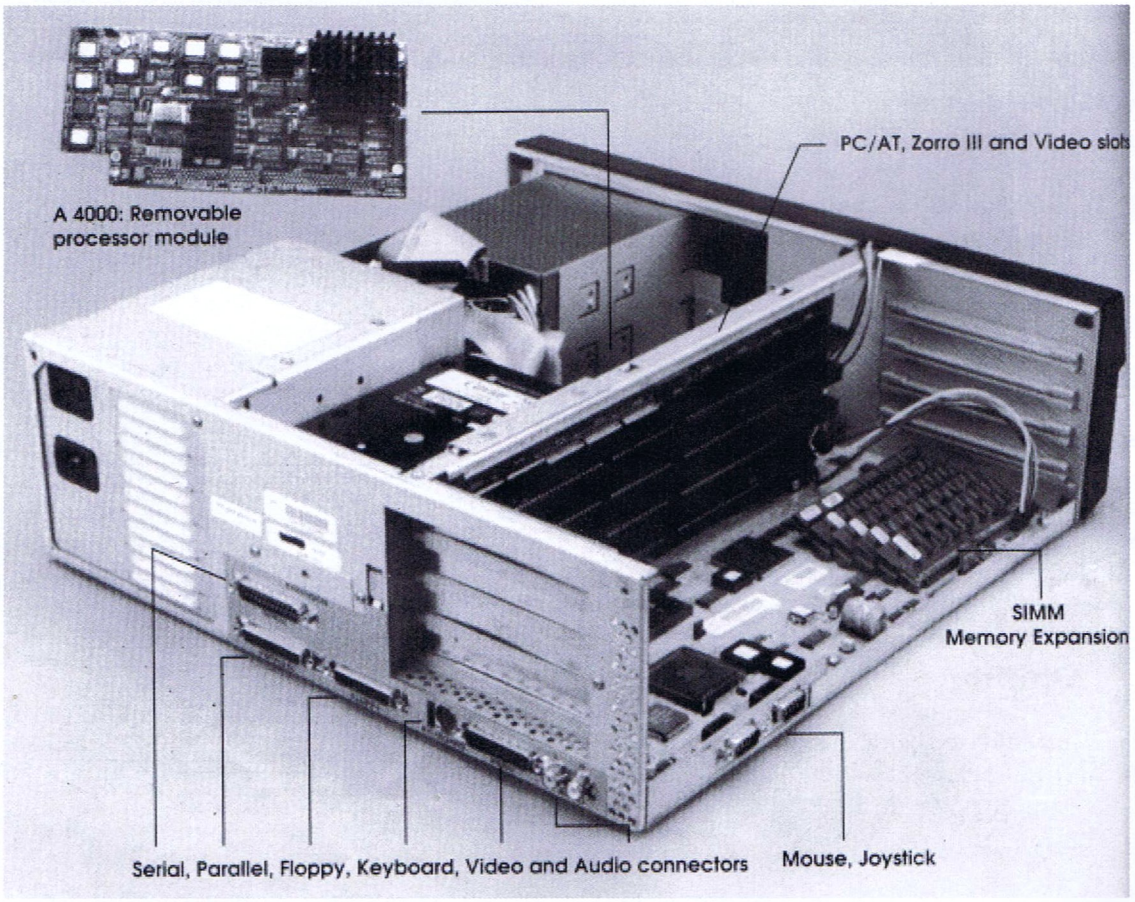
2 button Opto-mechanical mouse

Detachable keyboard with numeric keypad

150 Watt power supply

DIMENSIONS

39 cm deep x 38 cm wide x 13 cm high, approx 10 kg



Amiga and Video

by Brian Pearse

I bid you a personal welcome to my first editorial on video in this, NZ's own homegrown magazine for Amiga users, destined users, perusers and/or plain old die-hard enthusiasts. Over the coming issues, I'll delve into the subject of video, explain briefly how it works, explain the linking of video and computer, and amongst all this, show you how to start producing your own video.

For those readers who have questioned the future of the *Amiga*, especially in its relation to video (or graphics in general), I would like to use this first issue to explain (actually a pep talk) the actual prominence of the *Amiga* throughout the world as the leading and most popular desk-top video (DTV) computer. Granted, there are more powerful graphics computers available, the most notable being the Silicon Graphics range of computer workstations. These impress us continually with their special effects we see in movies on TV and at the cinema (e.g., *The Abyss* and *Terminator 2*), but for you and me, the largest drawback to these abilities is the cost. It would entail mortgaging the humble abode just to buy the computer, let alone contemplate the price of the programs or the additional equipment necessary to record your wondrous, eye-popping, jaw-dropping video. With access to that amount of ready cash, you could probably go and uplift all the above in your brand spanking new Ferrari Daytona. For the sake of the mild-mannered, non capped video crusaders like us, who must make do with the *Amiga* and the home video, such technology will have to remain a future dream.

One ability *Amiga* owners do share with Silicon Graphic workstation owners however, is multi-tasking. This in itself may not seem a great advantage, till you try to get by without it. Recording animated video sequences and sound can be very tricky, especially when the sound has to be timed in step with the video, for example when matching special sound effects to a video segment; but try doing this efficiently AND have the computer control the video recorder at the same time, all without the aid of multiple processors. (A processor is a complex device inside a computer which processes data mathematically, therefore its name, and is the actual powerhouse of the computer). For those readers who suggest this is possible with one very fast processor, it is. But I said "efficiently". Then try doing the same thing in full realistic colour and high resolution without the use of a dedicated graphics processor and you'll understand what I mean. Without getting too bogged down in this argument I would suggest that you read on and discover why the *Amiga*, despite having a power disadvantage on these workstations, still remains a force to be compared with. While talented companies and individuals continue to develop more powerful hardware and software (i.e., the extra bits to plug into or onto the computer and the programs you buy to make it all go) for the *Amiga*, it will remain a strong contender internationally within the rapidly strengthening and expanding audio and visual presentation arena, and on price alone, there is no close equal.

What it really boils down to is;

a) whether the computer itself is capable of being upgraded as technology progresses, and

b) the amount of support the computer receives and therefore, the availability of the necessary hardware and software to make this all possible.

The former point relies heavily on the original design of the computer, and luckily for *Amiga* owners, expansion is very much a basis of the original design. The latter point is a complex argument in itself, since without the hardware or software, the popular-

ity of computers of a specialised nature (like the *Amiga*) would decline. According to *Commodore* sales figures worldwide, the Amiga is indeed popular; over 3 million Amiga owners in six years is quite an achievement, and though the figure quite probably includes a large number of the *A500* model, this would provide any designers a ready cash return from game type programs which can be used to fund the more specialised developments. Examples of this wisdom can be found in the majority of current *Amiga* hardware and program developer companies.

What has all this to do with video? Well, that's a good question. The simple answer is, the *Amiga* was developed with video in mind. For example, look at the back of your *Amiga*: there is a socket labelled **Video**. This connects to any TV or video recorder with composite video input, and allows you to view or record your computer's image, albeit in black and white unless you own the *Amiga 1000*. Take the RGB socket that you connect your monitor to: the unmodified signal from this connector conforms very closely to a standard TV or video signal; in fact, the only reason why you need to fit a device to this connector, to see the colour signal on an ordinary TV, is to put all the different parts of the colour picture together into one wire just to be undone by the TV into the same separate parts that the computer sends out from the RGB connector in the first place. Silly, isn't it!

If you were to by-pass all the processing circuitry in the TV, and feed the computer's signal directly, you would have a much better quality picture. Your standard 1081 or 1084 monitor does this, however with better quality circuitry to make the most of the computer's signals. Your *Amiga* computer sends out what is called "analogue RGB (Red, Green, and Blue)" and all TVs use analogue RGB. Ask a TV technician to explain this if you require elucidation. Many up-to-date TVs now have a SCART socket on the back for connection to a RGB video source, as this is the highest quality signal available. By using analogue RGB (versus digital) you also have the potential to display an unlimited number of colours. You will gradually see an increase in the number of video devices using "analogue RGB" signal input or output because of its quality, something the *Amiga* designers must have envisaged years ago.

The third major reason as to why the *Amiga* is ideally suited for video, is its ability to be synchronised to an external signal. This simply means that computer images can be correctly positioned and recorded onto video without the need for expensive hardware. With the aid of a device called a genlock, the Amiga's internal graphics processor can be synchronised to an incoming video signal, e.g., from a video camera, and any computer generated images, e.g., words, pictures, animations, cartoons etc., will appear on top of, or behind, the video. Due to these in-built abilities as compared with other personal computers of equal or similar cost, the Amiga gained strong initial favour throughout the video industry. It immediately found its way into video and cable TV studios. No other low cost computer was available which could easily adapt itself into a video environment, with as many colours, or which could even do animation for that matter. For many graphic artists and animators, it was love at first sight and a dream come true. Programs to make use of this computer's special abilities became available, programmers strove to attract the artists' dollar, both sides learned more about this amazing computer, programs became more powerful, easier to use; the Amiga movement had begun.

For many years the Amiga remained unchallenged. Its popularity as a video tool increased. Developers and programmers made use of new technologies unknown previously. As this technology progressed, costs came down. As costs came down, more people bought more. Upgrading to larger memory capacity became a requirement rather than an issue. With more memory capacity available, programs became larger and more powerful. And along with all these power-hungry computers, users, hardware developers and programmers, came a greater recognition of the Amiga as a very powerful desk-top video workstation. One could even speak of milestones in the Amigas video career:- the unveiling of the A2000 model which allowed greater hardware expansion potential; entry into the TV broadcast industry with such developments as the *Magnigen* genlock in the USA and *Rendale* in the UK, and software such as *ProVideo Post*, *Broadcast Titler* and *Deluxe Paint III* (which are probably used by every video production studio throughout the world), to name a few.

And while all this fanfare was going on in the outside world, the inmates of "Alcatraz" were silently sucking on their lollies till all hours, working away at something so special, that all had taken a vow of secrecy. Then in 1991 someone spoke. The word spread like wildfire. Newtek had developed something so

amazing, it was tipped to have as much of an impact on the video world overnight as the *Amiga* had done for the past six years. Just two words, "*Video Toaster*". It was like a renaissance for the *Amiga*.

Twelve months onward and the sensation has dwindled. Unfortunately for Europe and us Kiwi's, the "Toaster" was another useless display of Yankee grandeur. America had again neglected the other $^3/_4$'s of the *Amiga* population by making the "Toaster" compatible with USA type TV standard only. Not to be passed over, other American and European developers have entered the high-end video market. The phrases uttered by their lips are now, "real-time animations and special effects at full speed in 16 million colours". "Move over *Toaster* and let the big boys pass". You can imagine the worry now on some peoples faces. Computer power which used to cost hundreds of thousands of dollars a couple of years ago is now one hundredth of the price. Not only that, but for years *Amiga* developers have realised the logic in standardisation. With the instigation of the A.D.A. (Amiga Developers Association) a few years back, a standard was conceived and agreed upon before further major development.

A prime example of how useful standards are, is our IFF (Interchangeable File Format) widely used by graphic and music programs. The IFF standard is now recognised by programs on other platforms, e.g., Adobe Photoshop on the Apple Macintosh. One of the more recent standards agreed upon by the A.D.A. is S.A.G.E. (Standard. Amiga Graphics Extension) developed by *Progressive Peripherals* and *Micronics Inc* to be used in conjunction with the powerful graphics processors (e.g., the 34020) manufactured by *Texas Instruments* in the USA. These processors are now responsible for the real-time (no waiting required) animations and effects mentioned earlier. Want to discuss programs? *TV Paint*; fast becoming the preferred 2-Dimensional paint program for serious video applications, especially in the UK where it is produced.

Like me, you're perhaps into the 3-Dimensional world. Test your imagination on the *Toaster's Lightwave* 3-D program if you're heading for the States. If not, we have at least two others, *Imagine* by *Impulse* and *Real 3-D* by *Activa*, both these programs do animations and effects you have to see to believe. All we need now is to persuade these program developers to make direct use of the graphics processors discussed earlier. All this power takes oodles of memory, the more the better. Think about 64 megabytes as a starting figure. I assure you, *Imagine* by *Impulse* will happily use any amount if it's available.

Mention video and somewhere along the line you think about the soundtrack. How does "better than CD quality playback, direct from a hard drive" grab you? Because it is video you'll naturally wish to synchronise this sound with your real-time special effect. No problem. In stereo? Absolutely, even with 64 (yes, 64) times oversampling. Yes, all within that box you call an *Amiga*. Of course, don't expect to do all this on your *Amiga 500*. Many of the above abilities come on separate boards which will only fit into the larger *Amiga's*. This means that if you wish to do some serious video, you will either have to trade up at some stage, or purchase your second Amiga. For the majority of *Amiga* owners, all the above is wishful thinking.

But like I said at the beginning, this first article is a pep talk and I set out to explain why the *Amiga* can still make it with the best of them, but for a much cheaper cost. With $50,000-$60,000 you could do the above right now, a price still beyond most people's cheque balance, BUT, the point is, you don't have to change computers to do it. If all the above amazes you, there is a valid reason such technology exists for the *Amiga*. Forget multimedia. It's just a new term to describe an ability the *Amiga* had years ago. Try rolling the words "Virtual Reality" off your tongue. Imagine having a dream come to life with the aid of a computer. Design your own kitchen by shifting benches, cupboards, appliances, around as if by magic, all instantaneously, then walk around your new kitchen as if it actually existed. This technology exists today. The *Amiga* is being used to help make it all possible. Why the *Amiga*? The reply from these people is quite simply, "because it is easily adaptable, because it is multi-tasking, and because they love to work with it". The *Amiga* was originally designed as a very powerful video and graphic computer. *Commodore* saw its promise as a low cost games computer; both strengths have been important in its history, and both I think, will determine its future. Due to the technological achievements by developers and programmers outside *Commodore*, the *Amiga* still manages to beat off its rivals.

Visual and spoken communication with computers is the way of the future, and whatever size and shape the computer of the 21st century may be, no doubt at least one model will have the name *AMIGA* stamped on the outside.

Nick's Notes

Sound Sampling

by Nick Divehall

As you have probably realised by now the Amiga has sound capabilities that put other PC's on the market to shame. As you sit in front of your *Amiga* astonished by the high quality stereo sound coming from your favourite game, have you ever wondered how those sounds found their way into your computer?

What is sound?

Before we go into sound sampling we must first define what sound is. Sound is made up of a series of vibrations in the air. These vibrations cause bones in our ear to vibrate and this information is then sent as nerve impulses to the brain where it is then interpreted as sound. The pitch of the sound is related to the frequency (speed) of the vibrations, volume and the waveform (pattern of vibration) of the sound.

So how is sound stored in our computer?

Sound is stored on your *Amiga* in the same way as sound is stored on a CD; digitally. This means that the sound waves are stored as numerical values inside our computers. A piece of hardware called a Sound Sampler is used to convert the sound waves into digital information. It does this by sampling the sound from a source such as a microphone, or some other sound source (tape, CD, etc.) at regular intervals. How fast the computer samples the sound is called a sample rate. The electrical sound signals that represent the sound waveform we hear are either positive or negative. A sound sampler converts these electrical impulses into a digital value. These values are then stored consecutively in RAM or disk.

The *Amiga* has an 8-bit stereo custom sound chip called *Paula*. The fact that the *Paula* is 8-bit means that the waveform sampled can be represented as a value out of 256. In comparison, a CD is 16-bit which means the waveform can be represented as a value out of 65,536. This gives a much higher clarity and resolution to the sound. The *Paula* chip is what is known as a Digital to Analogue Converter (DAC). This chip converts the stored digital values into the analogue (continuous) electrical impulses that are heard through speakers as sound.

The *Paula* chip also has four channels through which you can play a sampled sound. What this means is that you can have a total of four samples being played simultaneously, two in each speaker. The *Amiga* can sample at maximum rates above 50kHz (50,000 times a second). This exceeds the 44kHz of a CD but still lacks the resolution of full 16 bit. However, there are 12-bit and 16-bit sound cards available now for the *A2000* and *A3000*. These will offer maximum sample rates of about 80kHz offering sound quality exceeding that of CD's, making the *Amiga* a perfect platform for serious sound studio work.

Commodore is also considering using *Motorola*'s new DSP (Digital Signal Processing) chip in future *Amiga* models, this would offer 16-bit quality and high sample rates.

How to Sample

The practical part of sampling works like this. First connect your sampler to your computer and your source recording into your sampler. Then load up your sampling software for example *Aegis Audio Master* or *GVP*'s *Digital Sound Studio*. Then you go to the sampling menu, from there you must pick a sampling rate. The sample rate is how many times a second the

computer samples the sound. Usually a sample rate of about 16,000 samples a second (16 kHz) is used for your average sample. The faster the sample rate the better the quality of the sample. You may ask if the higher the rate the better the quality why not always sample at a high rate. The reason is simple: Memory. Sound sampling is very memory intensive, so the higher the sample rate the more RAM the sound sample takes up. Unless you are working on an *Amiga* with a great deal of RAM you must be aware of the amount of memory your samples are taking up.

The rule is the higher the frequency of the sound being sampled the higher the sample rate to reproduce the sound sufficiently. So, for a high pitched instrument such as a high hat you may sample at 20 kHz to reproduce the sound correctly, but for an instrument such as a bass drum you can get away with a much lower sample rate, without distorting the sound beyond recognition. The trick is to sample the sound at the highest rate possible with your system and then get the computer to calculate the sample at a lower sample rate using an option in the software called **Resample**. The **Resample** option takes the sample and then converts it to a lower sample rate which will use up less RAM. This gives a much better result than sampling at a lower rate to start with. Once you have set the sample rate you then select the sample option. Now the computer will sample the incoming signal and save it in RAM ready for you to use.

Sound Sampling Sources

You can sample from two sources, a recording or live through a microphone. Either way this involves connecting your stereo system to your sampler. This is done connecting leads from your sampler to the *Audio Out* RCA jacks on the back of your stereo. The leads that you use must be of very high quality as samplers are prone to interference especially from your computer and monitor. The leads should preferably be made out of shielded oxygen free cable and have gold plated connectors. A standard set of these leads can be purchased for around $30, and they can make the difference between a perfect reproduction and a distorted mess.

If you are making a live recording of a person's voice, the quality of the microphone makes a considerable difference to the quality of the sample. To put it bluntly the cheaper the microphone the more tinny the sample will sound.

CD's are obviously the best recorded source to sample from as they give the best quality audio available for home use. When you are sampling, the quality of your source is very important, as any hiss, crackle or pop will be accentuated when the sound is sampled. Also to make your *Amiga* sound even better it is a good idea to plug your *Amiga* into your stereo system. This is done by connecting the leads that usually go from your computer to your monitor to the Audio Input (line in) on you stereo. The difference between the sound from your monitor speakers and the sound from your stereo is quite incredible.

There are many CD's and tapes produced specifically for sampling that are full of sound effects and noises. If you cannot find any at your local record store, the best place to go is *Real Groovy Records* at the top of Queen St., Auckland. They have a section devoted to sound effect recordings and they are quite reasonably priced. Also, there are many public domain disks available that are filled with useful and interesting samples and music.

What is sampling used for?

Now that you know how sampling works and how all those sounds found their way into your computer, it's time to find out what you can do with them. Once you have a sampled sound in your memory there are many special effects you can use on them. My favourite is to flip the sample backwards, this can create some interesting effects. An example is the *Red Hot Chilly Peppers* song *Give It Away Now*. If you take a close listen to the guitar solo in the middle of the song, you will notice that the guitar solo has been sampled and flipped backwards.

Another useful effect is flanging. This takes the sample and then superimposes the sample on top of itself with a

slight delay. This gives the voice or sound a more full-sounding resonant tone. This effect is used by people in the sound studio to improve the quality of a singers voice. If you have the *AudioMaster* or *AudioEngineer* software you can do this in real time (instantly without having to wait for the computer to process the effect). If you wished to, you can hook it through a karaoke system, and maybe improve your voice! You can also edit the sound in much the same way as a word processor, cutting and pasting the sound using your mouse. Using this method you could sample a person's voice, cut out pieces of the sample and rearrange the words of someone's sentence, and really put words into somebody's mouth.

Another useful feature is looping. This lets you repeat a sample repeatedly. This is useful if you have a sampled drum beat you want to repeat for an entire song. It would be a waste of memory and be very impractical to sample the drum beat for the length of the song, so what you do instead is sample the drum beat, or instrument, select the part of the sample you want looped (repeated) and how many times. If you want, other parts of the sample can be looped in succession. This can be used on speech to create *M-M-M-Max Headroom* type effects.

One of the most powerful features available for making original sounding samples is a merging option. This allows you to take a trumpet sample and merge it with a bass guitar sample to create a new instrument with a unique quality. This gives you the option to produce a limitless number of original instruments.

Some of the other effects available (depending on your software package) are bass and treble boost, fade volume up and down, changing the pitch, converting mono to stereo, and echo, just to name a few.

How can I make music with my samples?

Once you have some samples you will want to start making some music with them. The most common way of arranging the samples is to use what is called a sequencer program. There are many public domain programs which do this. The most common are *Sound Tracker*, *ProTracker*, *MED*, all of these are readily available through your local retail store or user group. Using these you can sequence and arrange the way your samples are played, alter their pitch and octave, and control things such as vibrato and volume. Once you have created your musical master piece you then store it as a module which is all the samples and the sequencer information stored as one file. To get an idea of how it's done it is a good idea to obtain some modules from bulletin boards or through public domain. You will find some brilliant examples of music that will fool most people into thinking they are listening to the radio.

Choosing your sampler

There are quite a few sound sampler hardware and

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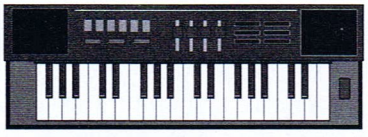
software packages available, and in future issues we will do in depth reviews of some of these. Overall though, the prices range from about $150 - $400.

Of the sampling packages on the market the pick of the bunch are *Aegis AudioMaster* and *AudioEngineer*. They have some excellent features that alternative packages lack, however they are more expensive than other packages. For example most sampling software packages only allow you to store samples in your chip memory, this is the part of your memory where graphics and sound are usually stored by your computer. What this means is that if you had 1 megabyte of chip memory and 4 megabytes of fast (extra) memory you would only be able to use a megabyte of sample space. The *Aegis AudioMaster* and *AudioEngineer* software packages let you access any extra memory you may have to be able to create extra long samples. Another feature is that if you have a faster CPU than the standard 68000 such as a 68020, 68030, or 68040 you can sample at higher sample rates up to 59,000 samples per second! It also has a wide range of effects and editing functions. This software can be bought separately and used with almost any sampler.

It is the hardware that differs between the *AudioEngineer* and *AudioMaster* packages. They both can sample at maximum sample rates of 59 kHz, but that is where the similarity ends. The *AudioMaster* is the more reasonably priced of the two, and the hardware still boasts some outstanding features. *AudioMaster* has a control for the incoming audio level, this is useful as different sources put out different levels of signal. So if the signal from your CD player was too high and was distorting your samples, you could then decrease the level so that the sampler can sample it effectively. If on the other hand the signal was too low and weak samples were coming out, you could boost the signal up. It has a built in microphone which is quite convenient and a long cable going to your parallel port which means that you don't have to keep reaching around the back of your machine to adjust the settings on your sampler.

The *AudioEngineer* has the best sampler hardware of any sampler on the market. It has separate left and right channel controls, and a parallel through port which is important if you have a printer as they both use the parallel port to connect with your Amiga. This saves having to keep unplugging the printer to put the sampler in and vice versa.



Overall *GVP's Digital Sound Studio* (DSS) sampler package is the best value for money as it offers some very powerful software which has the sequencer, sampling software and MIDI (Musical Instrument Digital Interface) all built into the one program. MIDI is another musical aspect of the Amiga that ties in with sound sampling. MIDI is the hardware and software that lets the *Amiga* communicate and control musical instruments with a MIDI port, such as a keyboard. You can mix the sound samples on your *Amiga* with the sounds available on your keyboard through a sequencer and produce top quality music.

With DSS having the sequencer, sampling and MIDI software built into one program it means you can create your sample and then flip to your sequencer by selecting an icon rather than having to load up a separate piece of software. The hardware is also good. It has separate input level controls both left and right channels and can sample at a maximum rate of 51,000 samples a second. Also costing a reasonable $249 it is good value for money. There are other sampler packages available, however the ones I have mentioned are the most powerful and popular.

A word of caution! The minimum requirement for sampling is 1 meg of RAM (the more the merrier), as a few samples will gobble through your RAM fairly quick as sampling is very memory intensive. So if you are unlucky enough to have only 512kb then it would be worth investing in some extra RAM.

With some Kiwi ingenuity and a bit of imagination you should soon churn out stereo effects and mixes comparable with the likes of *C&C Music Factory*. If you are not musically inclined, sampling is the best way to let you express your hidden musical side. If you are musically inclined sampling will definitely open up a whole new creative tool for you to take advantage of.

Continued on page 23

Supra FAX Modem

By Zane Hemingway

I was released from my chains at Micro Pro's to do a test drive of the new Supra FaxModems range, these being the 14.4K and the 9600 FaxModem.

On first impression I unpacked the box to find a modem that can fit into the palm of my hand. My first thought was either these guys know what they are doing or they left out a whole set of features (like carrier detect or something). I was pleased to find that my first line of thought proved correct. So away I went, a couple of quick plug ins, loaded up my comms program and that was it. All I had to do was select my new speed of 38400 (to get the most out of the little baby), turn CTS/RTS on and away it went. No messing about with configurations, it just went and went and went and..... It reminded me of the old saying "Putting a V8 into a mini", boy can this thing download!

My first connection was to the AMIGA NZ UG BBS, a *Supra FaxModem* 9600 and I downloaded my first file. It was a 660K program which I always wanted to download but could never be bothered downloading (I didn't want to waste 38 mins downloading it at 2400 baud). So away I went. One blink later (well, OK maybe it was a long blink) and a 660k file was sitting in RAM on my *A500*. It took the *Supra FaxModem* only 6 minutes 40 seconds, amazing! At this point I drop-kicked my 2400 modem into the bin, pulled out my cheque book and signed my life away.

Further testing showed that I got 1700 cps on average from a DMS file and 2800 cps on a straight text file with a 14.4 baud modem. The 9600 baud modem, which I only test drove once, gave speeds of 1150 cps on DMS files and 2200 cps on text files.

One of the "neat" features of the 14400 *Supra FaxModem* is that it has a LED display panel along with the usual blinking red lights. The purpose of the LED display is to tell you your actual connection speed, data compression used, if carrier is still there, errors during transmission and a heap of other features. But for the person who always wonders what their modem is doing, this feature solves all the mystery. One quick glance at the little screen as it cycles through its messages gives you reassurance that everything is as it should be.

You will probably buy this modem for its speed, but it has the added bonus of being a really good facsimile as well. The *Supra FaxModem* will send to and receive from most faxes, or so I've been told. I only faxed three people before I got bored, but the faxes that I did send all worked well. These faxes included a *ProPage* document and a *DPaint* file. In my opinion these came out a little clearer than with a normal facsimile. The only fax that I received was a price list of computer equipment from Germany, and it came out crisp and clear.

I have a friend who uses the *Supra FaxModem* as a scanner. Yes, that's right, a scanner! By setting the modem to receive faxes and then by using a proper facsimile machine, he faxes the image to his computer and then touches up the image in *DPaint*. This DOES work and works well! An added note about the fax program *GPFax:* This program is a very professional and bullet proof piece of software (one of the few that works like it should). It is so easy to use, looks good and takes advantage of *WB2.X* features.

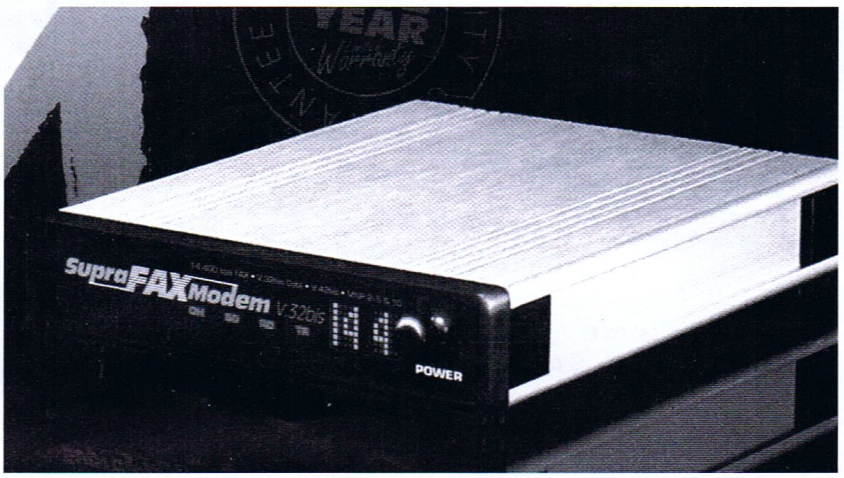
To sum up: - If you don't own a modem and don't intend to, then the *Supra FaxModem can be a really good paper*

weight, it also has really neat flashing lights!

- If you are a computer person wanting to buy a modem, then go out and purchase a 2400, use it for two or three months, see if you enjoy modeming and the contacts it brings you and your computer. If you do, then take the plunge and buy a REAL modem.

- If you are a modem user and want to increase your speed but file transferring is not important, then buy a 9600 *Supra Faxmodem* and enjoy all the advantages of speed at a lower cost.

- If you are a modem freak who lives your life plugged in to the telephone, then take a walk on the wild side with a *Supra FaxModem* and boost your download ratio as you are going to need it.



Sound Sampling

Continued from page 21

Taste test

You will need *MED* and a disk of *Sound Tracker* modules to do the following practical demonstration of sound sampling. If you do not already have this public domain software then contact your nearest retail store.

First load up *MED* by inserting it into your disk drive and double clicking on its icon. You will then be confronted with *MED*'s somewhat cluttered array of icons.

To load up a module first insert the disk with the modules on it into your disk drive. Then select the disk drive to load from by clicking on the corresponding device in the left hand corner of the screen. If you have one disk drive this will be DF0:, if you have two disk drives this will be DF1:. You should have a list of files on the screen, now click on the name of the file you wish to load and then click on the **ST MOD** icon which is located in the top middle of your screen.

To play the module first click on the **PLAY** icon in the top right hand corner of the screen. A new selection of icons will appear in the top left hand corner on the screen, now click on the **PLAY SONG** icon. To stop the song click on the **STOP PLAYING** icon.

Playing with the samples

You can scroll through the samples by clicking on the icon **01** which is below the top menu on your screen. To move the value of the number up click on the icon with your left button, to move it down click on the icon with your right button. You can play the samples like a piano by using the keys on your keyboard. The top two rows of keys are the top octave, the bottom two rows are for the lower octave.

To edit and manipulate your samples click on the **SMPED** icon in the top right of your screen. This will bring up a new screen in the lower portion of your display.

Scroll through your samples and find a sample you would like to add some echo to. This is done by first entering some values into spaces next to the **ECHO** icon. Move your mouse over the black space next to **DLAY**, now click in the space with your left mouse button and enter 80 then hit return and type 7 then hit return again. Now click on the **RANGE ALL** icon then click on the **ECHO** icon. Now to hear the sound hit a key on your keyboard. There you go, all you need now is a sampler and you can make your own samples.

If you have any questions at all about music on the *Amiga* or have done some interesting things with the *Amiga* to do with sampling or music, you are welcome to write to us.

Blitz BASIC's

by Simon Amstrong

This column is for users of Blitz BASIC 2 a hot new programming language for the Amiga. For readers who are not familiar with Blitz BASIC 2 it is a package written in New Zealand by Mark Sibly and is published by ACID software. I'm the marketing manager for Acid Software, however I'm also a professional programmer so don't think this column is just a big marketing exercise, no sireee!

Blitz2 is ideal for writing both applications and games for the Amiga, this month we shall avoid both categories and start with some very simple educational type programs.

MATHS QUIZ

Listing 1 is a simple maths quiz program that generates an endless string of arithmetic problems. The value in the **maxvals** variable limits the numbers used in the problems, for beginners in maths you could decrease it to 9. The **maxprobs** variable limits the type of problems the program generates, if you want to miss out division use the value 3, for just addition and subtraction decrease it to 2.

On..n..Gosub will gosub the nth program label listed after the Gosub.

Rnd(maxprobs)+1 generates a number between 1 and **maxprobs**, Blitz2 chops the fraction off the random number generated because **On..Gosub** requires an integer. To illustrate this point the code **Int(Rnd(5))** will only generate integers 0..4 inclusively.

The **On..Gosub** effectively branches to either the add, subtract, multiply or divide **problem_setup** routines. We keep things simple by setting up the problem with these 4 different routines but using the main program to pose the problem and check the answer. The routines return the operator (+, -, / and *) in **q$** so the main routine can also generate the text for the problem.

The add and multiply setups just pick two random numbers, and generate the answer in **c**. For divide and subtract it is easier to generate one of the numbers and the answer, then calculate the other number by working backwards.

After the problem is generated, it's back to the main loop, where the program prints the problem and gets the answer from the user. A few Blitz specifics should be mentioned here, first **NPrint** moves the to the next line, **Print** leaves the cursor after the last character printed. In other BASIC's you would just use Print and add a semicolon at the end of the parameters to stop the cursor going to the next line. Also **d=Edit(8)** is the same as **Input d** in other BASICs, it also limits the user to 8 characters.

The only other thing to mention is the **DEFTYPE .w** at the start which means all our variables are integers, this is important as the **problem_setup** routines would generate fractions, ouch!

GEOGRAPHY QUIZ

This simple program illustrates using arrays and data statements. The string array **c$(100,1)** holds the names of countries and their capital cities. As with all other BASICs the actual dimensions of the array are 1 larger than that specified, so our array can hold 101 pairs of strings.

The **Restore capitals** command means that any **Read** commands will start reading the data from after the capitals program label. We then loop through the data placing the string pairs in **c$(n,0)** and **c$(n,1)**. The ***,*** signifies the end of valid data.

The line after **Repeat** selects a string pair, and copies the two strings into variables **q1$** and **q2$**.

In contrast to the Maths Quiz we select which type of question to pose with a **Select..Case..EndSelect** structure. Unlike **On..Gosub Select Case** can work with fractional numbers so we use the **Int(Rnd(2))** code to generate the numbers 0 or 1. If we do not include the **Int()**, numbers such as 1.2399 are generated and neither **Case** is met.

Either two of the questions is posed and the answer copied to the **ans$** variable. The only other point of interest in this program is when it came to evaluating the users answer, because we do not care about

capitals (no pun intended) we make both the user's answer and the correct answer upper-case with the **UCase$()** functions when we compare them.

SPELLING PROGRAM

The last listing uses the **Speak** command to narrate the questions via the *Amiga*'s speech synthesiser. The **Speak** command has been added along with about 40 other commands in Blitz User magazine issue 2. If you are a Blitz user and have not received the second issue please contact me at Acid Software, see page 35.

Well, looking at the listing, there is not much there that we haven't already covered. Instead of just speaking the word like a few rather nasty expensive "educational" programs do, we use a whole sentence to put the word in context. Understanding the Amiga speech synth is difficult at the worst of times!

Enough programming...

Blitz 2 has many great commands that are ideal for developing fun and interesting educational programs, the above was not intended to achieve either. Once you have the basic (ouch) concepts in place, then its time to add the big fonts, the friendly animation, the stimulating soundtrack, etc.

I'll try to keep the listings small but valuable in this column. Rather than tackle general problems Blitz users are having (which is what our own magazine is for), we'll keep with the Keep It Simple Style.

- Simon.

```
;
; maths quiz
;

DEFTYPE .w

maxvals=12      ;go up to 12 times table
maxprobs=4      ;on gosub all 4 + - * and
/ type problems

NPrint "MATHS QUIZ, ENTER -1 TO EXIT"

Repeat
  On Rnd(maxprobs)+1 Gosub myadd,mysub,my
mult,mydiv
  Print a,q$,b,"="
  d=Edit(80)
  If d<>c Then NPrint "WRONG!"
Until d=-1

End

problem_setup:
  myadd:a=Rnd(maxvals+1):b=Rnd(maxvals
+1):c=a+b:q$="+":Return
  mysub:b=Rnd(maxvals+1):c=Rnd(maxvals
+1):a=b+c:q$="-":Return
  mymult:a=Rnd(maxvals+1):b=Rnd(maxvals
+1):c=a*b:q$="*":Return
  mydiv:b=Rnd(maxvals)+1:c=Rnd(maxvals)
+1:a=b*c:q$="/":Return


;
; geography quiz
;

Dim c$(100,1)
n=0:Restore capitals
Repeat
  Read c$(n,0),c$(n,1)
  n+1
Until c$(n-1,0)="***"

NPrint "GEOGRAPHY QUIZ, ENTER TO EXIT"

Repeat
  q=Rnd(n-1):q1$=c$(q,0):q2$=c$(q,1)
  Select Int(Rnd(2))
    Case 0
      Print "What is the capital city of
",q1$,"? "
      ans$=q2$
    Case 1:
      Print "In which country is ",q2$,"? "
      ans$=q1$
  End Select
  a$=Edit$(80)
  If UCase$(a$)<>UCase$(ans$) Then NPrint
"WRONG! "
Until a$=""

End

capitals:
  Data$ New Zealand,Wellington
  Data$ Australia,Canberra
  Data$ United States,Washington
  Data$ England,London
  Data$ ***,***


;
; spelling program
;
Dim c$(100,1)
Restore animals

NPrint "Spelling Program"

SetVoice 150,110,1,0,64,22800

For i=1 To 3
  Read a$,b$
  Speak b$
  Print "Answer = "
  c$=Edit$(80)
  If c$=a$
    NPrint "Correct"
  Else
    NPrint "Wrong it is spelt ",a$
  EndIf
Next

End

animals:
  Data$ "cow","a cou goes muu, spell cou"
  Data$ "bird","a bird goes tweet tweet,
spell bird"
  Data$ "dog","a dog goes wuff wuff, spell
dog"
```

South-East Amiga (Auckland)

Do you live in the South-East Auckland suburbs? Are you new to *Amiga* computing? Have you been a "loner" struggling to learn to use your *Amiga*?

If your answer to these three questions is "yes", then call on us and we'll be only too glad to help you. Our membership includes people who are expert in all the popular programs. At our meetings we have speakers on a different program or subject each month.

For any enquiries call any one of the following :-

G.S.Williams (09)576-2022
L.Nel (09)535-5008
L.Shearing(Mrs) (09)534-9107

Meetings on the third Wednesday of the month at 7:30pm at St Columba's Presbyterian Church Hall, Pakuranga Highway (next to "The Plaza" shopping centre) Pakuranga.

Wanganui Amigans

Meetings on the 2nd thursday of each month at 7.00pm at St Barnabus Church Hall, 34 Maxwell Avenue, Wanganui.

All welcome! The purpose of the meetings is to explain various uses of the *Amiga* and help with any problems.

Contacts:

Liam Greenwood(06)345-5610
Peter Woods (06)343-1411
Robin Halligan (06)344-4145

Mailing Address: 44 Durie Street, Wanganui.

EMail to Postmaster at Amigans.Gen.NZ

Wanganui Amigans run a BBS called THE AMIGANS. This is on 347-1200. This board is connected to USER-NET and EMAIL.

Nelson Amiga User Group

Meetings are held on the third Thursday of each month at 7.30pm at St. John's Hall, 55 Muritai Street, Tahunanui.

Visitors and new members welcome.

For more information telephone James Chappell (President) on 548-9948.

Waikato Amiga Group

Club meetings are held on the first and second Thursday of each month at Hillcrest Normal Primary School at 7.30pm.

Contacts:

Russell Christie (07) 824-8595
Bruce Brodie (07) 855-9294

Amiga Christchurch Inc.

Meetings held at the Horticultural Hall, Riccarton Avenue, on the second Tuesday of each month, starting at 7.30pm.

The club has seven special interest groups; Advanced Programmers, Education, Video, Desk Top Publishing, Business, Wargaming-Adventuring-Strategy, and Beginners.

More details are available from Phil Stuart-Jones (Membership Officer) on 365-1448.

Amiga New Zealand (Auckland)

North Shore meetings are held once a month on the first Wednesday of each month starting at 7.30pm at the Takapuna Presbyterian Hall, corner The Terrace and Anzac St., Takapuna.

For further information contact Roger Manson on (09) 473-9657.

Central meetings are held once a month on the second Wednesday of each month at St. Johns Church Hall, Chandler Ave., Royal Oak starting at 7.00pm.

For further information contact Garran Whitley on (09) 630-7835.

Western meetings are held on the third Tuesday of each month at 7.30pm at Holy Cross School Hall, corner Lavelle Rd. and View Rd., Henderson.

For further information contact Leo Wong on (09) 818-3217.

Youth Group and New User Group meetings held on the third Sunday of each month at 12.30pm at Willow Park School, Compton St., Northcote.

For further information contact Noel Fuller on (09) 413-9127.

We will publish one page of User Group information each month. We only print info if it is sent to us, we don't go looking for it.

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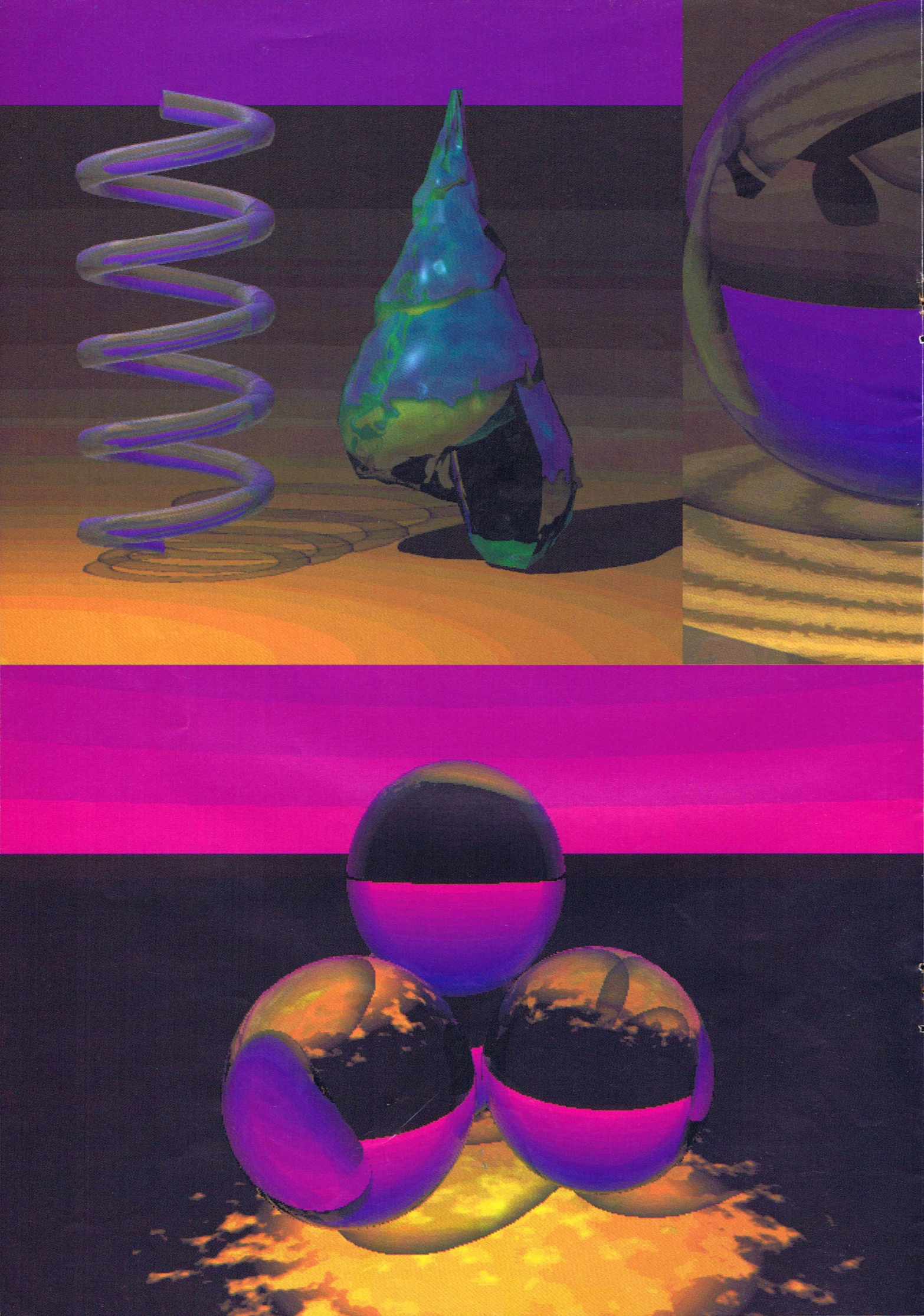

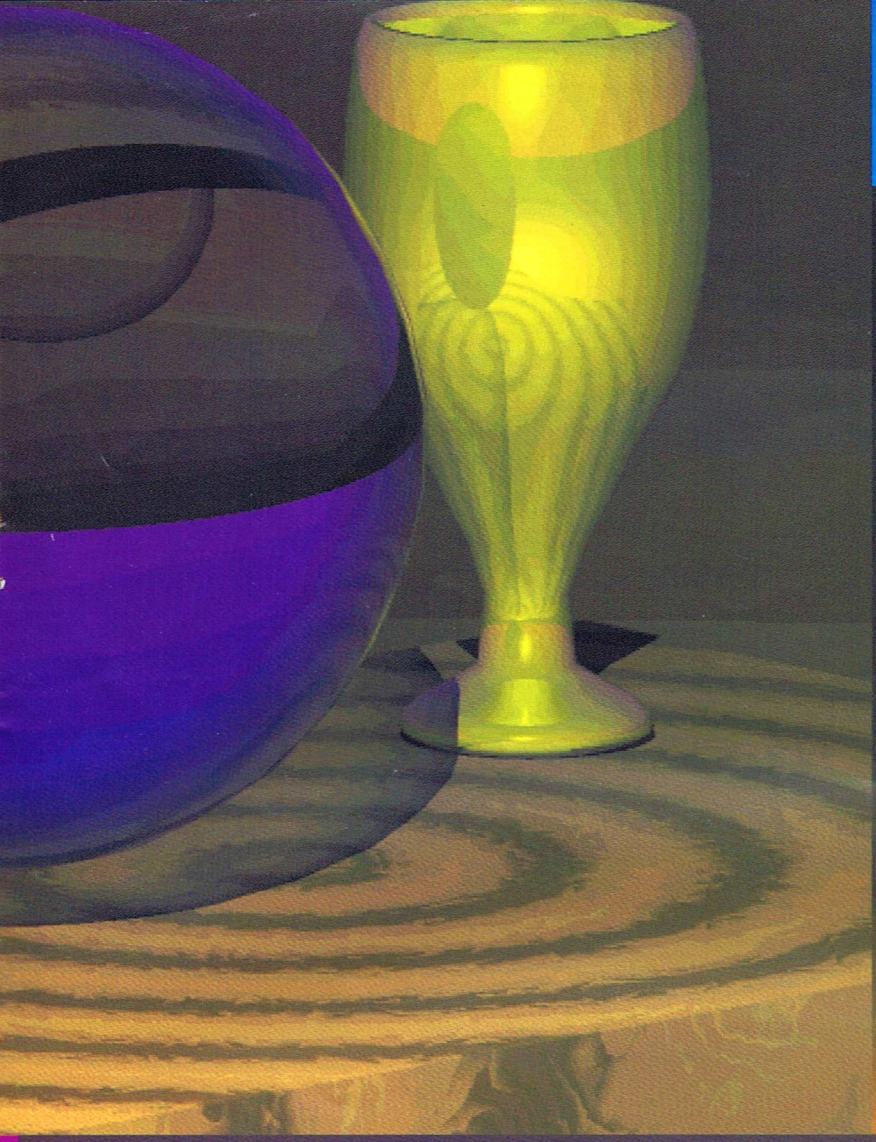

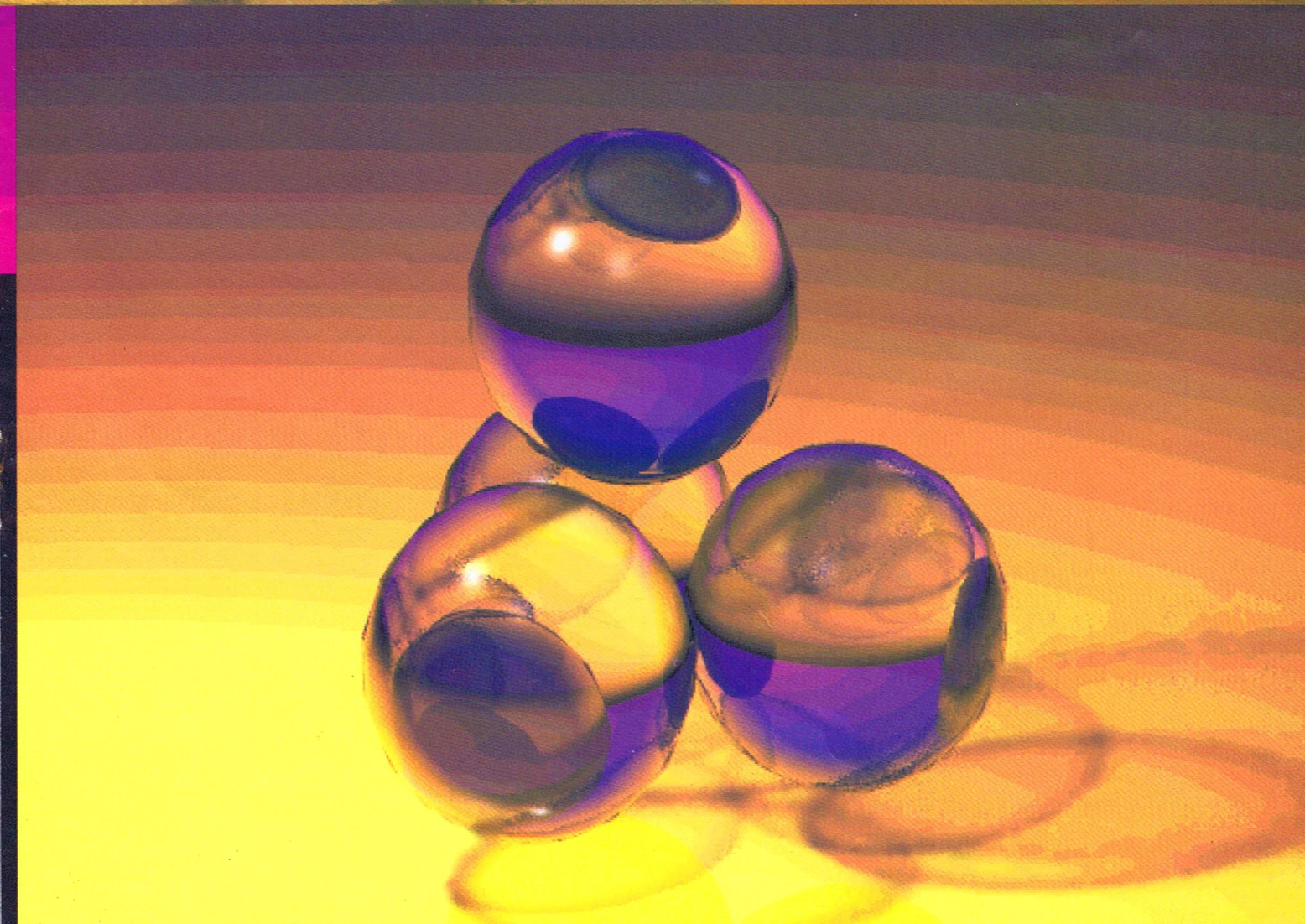

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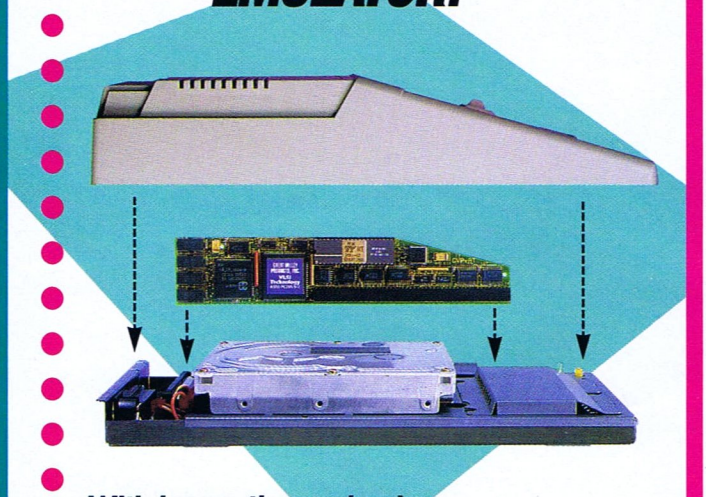

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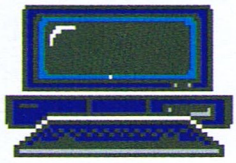

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Amiga 600

By Nick Divehall

The Amiga 600 is revamped, updated and especially tailored to suit those with a limited budget, with its inexpensive hard disk packages and powerful expansion capabilities.

Clearly *Commodore* has a mission for the *Amiga 600*, a mission to keep the *Amiga* as New Zealand's most powerful and popular home computer and to propel the *Amiga* further into other areas, particularly in the fields of multimedia, education and video. The *A600* shows a new direction for the *Amiga 500's* market, more power at a lower price. But have any compromises been made?

At the moment the *A600* is being sold in two models, the *A600* $989 and the *A600HD* $1384 (These prices are *Commodores* recommended retail). The *A600HD* has a 40 megabyte hard drive installed and the *A600* can be easily upgraded with a hard drive kit. Both models come with *Workbench 2.05* (the latest version of the *Amiga*'s operating system), the Enhanced Chip Set (new hires graphics chips), and one megabyte of chip memory. It also has a built in modulator which means that it can be easily hooked up to a TV. Two new powerful expansion slots have been added, these will be explained in depth later in the article.

At a glance, the *Amiga 600*'s compact size and lack of numeric keypad, may lead you to believe that the *A600* is a cut down and less expandable version of the *Amiga 500*. If you take a closer look you will quickly realise that you have been misled. On closer examination you will find new exciting features that the *A500* lacks, and also (of course) some drawbacks.

It looks so small!

One of the first things you will noticed about the *A600*, is its reduced size compared to its predecessor the *A500*. But you have to remember that size is not everything.

The reason for the *Amiga 600*'s reduced dimensions is due to the extensive use of surface mount technology (SMT), primarily used in laptops. SMT means that instead of the chips being in sockets they are fixed directly to the motherboard. By using SMT it makes the *A600* more reliable as it eliminates the common problem of chips becoming dislocated from their sockets. It also cuts down production costs, making the *A600* more economical for the consumer.

The use of SMT also means the chips are made smaller. This causes the overall size of the computer to be reduced, therefore the absence of the numeric keypad on the *Amiga 600*. This lack of numeric keypad should not prove to be much of a problem as the omitted keys are emulated by software elsewhere on the keyboard. It is this SMT technology that enables the *A600* to have a TV modulator built onto the motherboard. This enables you to hook the *A600* up to your TV while keeping your video port free. On the *Amiga 500* a TV modulator had to be purchased separately and used up the video port to which devices such as genlocks were connected.

Also the *A600* has colour composite video which means that you can output your animations, titling, etc., directly to your VCR to make a video tape of them. This is extremely useful for home video work if you want to use the *Amiga* to put credits on your home movie, for instance.

While SMT makes the *Amiga 600* the most reliable *Amiga* yet, it unfortunately makes it very hard to replace a faulty chip or to upgrade the motherboard with an updated

chip. The only chip on the motherboard to be socketed is the ROM chip, which contains information for the operating system. This makes it easy for revised versions of the operating system to be upgraded.

The separate power supply, though still the same physical size as the *A500*, is much lighter due to the lower component count. With *Commodores* emphasis on compactness, it is surprising that the power supply was not incorporated into the motherboard, as one of the *A600*'s best features is that it is small enough to put in a briefcase. The external power supply seems to be an unnecessary hassle. Third party developers are already working on conversion kits to turn the *Amiga 600* into a laptop, and an internal power supply would have made this process much easier and cheaper. Overall though, the case is modern and stylish, and is better thought out than the *Amiga 500*'s.

The newly designed case of the *A600* has a reassuringly solid feel to it, and it is more modern and classy in it's styling compared to the *A500*. The case is also a different colour from the rest of the *Amiga* range, a lighter and more tasteful *Limestone Beige*. This new colour also appears on *Commodores* new multifrequency monitor, the *1960*. This might indicate that the rest of the *Amiga* range could be changed in styling or at least in colour.

The disk drive on the right hand side is now angled to make insertion of disks more comfortable and ergonomic. Also the joystick and mouse ports have been sensibly placed on the right hand side making them easy to access. The only possible problem I could find with the case is the PCMCIA slot (which stands for Personal Computer Memory Card International Association and is often called the "credit card slot") on the left hand side has no cover to protect it when it is not in use. Overall the case is far more stylish, ergonomic and practical compared to the *A500*.

Expansion

The expansion ports on the *A600* have been upgraded to new enhanced and far more versatile replacements. This makes them more powerful and flexible, but unfortunately totally incompatible with those of the *A500*.

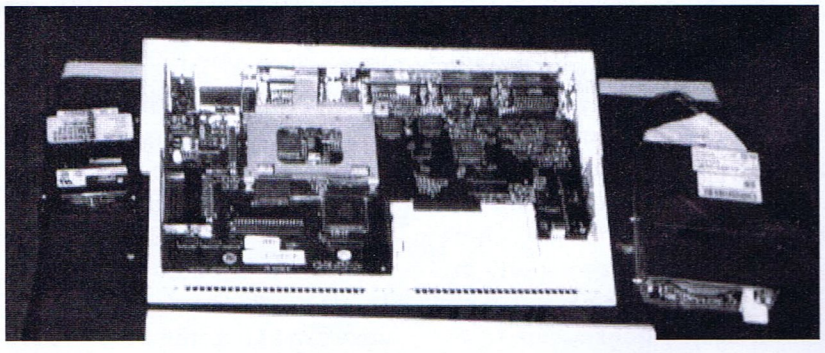
The trap door slot underneath allows the user to upgrade the *A600* with the *A601* 1 megabyte RAM expansion card, giving a total of 2 megabytes of chip RAM. Soon to be available for this slot is a 386 PC emulator which will have additional memory on the card that both the *Amiga* and the emulator can take advantage of. This emulator will integrate and multitask seamlessly with the *Amiga* like any other *Amiga* application. There is a new "credit card" (PCMCIA) interface on the left hand side of the *A600* which supports a wide variety of expansion cards including RAM expansion, fax/modem, IBM 386 emulators, networking cards and ROM cards just to name a few. This slot is also where the *A670* CD ROM drive will be fitted.

An attribute of the "credit card" slot is that it is an industry standard interface so the cards for it do not have to be made specifically for the *Amiga*. Using the correct driver software the *A600* has access to the hundreds of cards that are already available for other systems such as laptops, notebooks, and palmtops. Already the amount of cards available for the *credit card* slot exceeds the number of cards that can be purchased for the *A500*'s expansion slot.

As well as the *A601* RAM expansion card, further RAM expansion is possible with 2 or 4 megabytes "credit cards". Presently the "credit card" RAM expansion cards retail for about $800, making them expensive as far as memory goes. However, these prices are bound to fall to a more reasonable level in the future. Of the new features to be added to the *A600* the "credit card" slot is by far the most powerful and versatile.

Hard drives

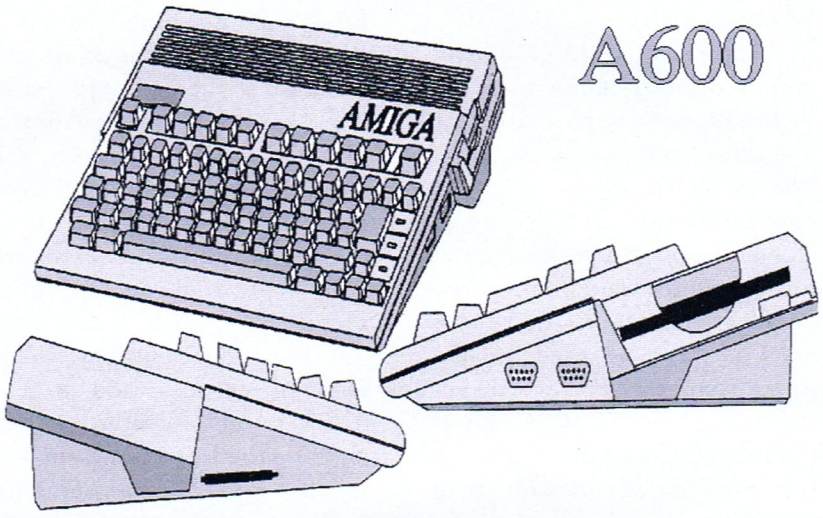
If there was one thing an *Amiga 500* owner could have



asked for it would be a cheap hard disk. Well, *Commodore* solved this problem and built a hard drive controller into the motherboard of the *Amiga 600*. Both the *A600* and *A600HD* have a hard disk controller and mounting bracket built in. The hard drive being sold with the *A600HD* has been changed three times since its release, first it was a 20 megabyte hard drive then a 30 megabyte HD and now it is currently being sold with a 40 megabyte hard drive.

The *Amiga 600* supports 2.5 inch IDE (Integrated Drive Electronics) hard drives. As these hard drives are small they can be installed internally making the *Amiga 600* very compact. These are manufactured by companies such as *Quantum*, *Conner* and *Western Digital* as low powered hard drives for laptops. The hard drives range in capacity from 20 to 425 megabytes. The price of the *A600HD* is extremely good value but if you are thinking of buying an *Amiga 600* and later installing a higher capacity IDE hard disk such as a 240 megabyte, think again. At the moment they are very expensive compared to the standard hard disks available for the rest of the *Amiga* range. Another idea would be to buy a SCSI interface for your "credit card slot", you could then connect cheaper and faster 3.5 inch hard disks.

The way that the *Amiga* interfaces with the hard drive is by the software and hardware tricking the *Amiga* into thinking that a IDE hard drive is a SCSI drive, which is the standard hard drive controller for the *Amiga* at the moment. This is done with the *Gayle* chip and the *Kickstart* ROM.



The *Gayle* chip is a new chip that contains the IDE hard drive controller and controls the interface with the PCMCIA "credit card" slot it replaces the function of the Gary chip found in the *A500*. The *A600HD* is also installed with *Kickstart* version 37.350 which includes the IDE device driver software to make the IDE hard drive look like a SCSI hard drive. The process of converting the IDE into SCSI slows down the hard drive slightly, but most people would not notice this. It is, however, faster than the *A590* Hard Drive available for the *A500*.

Soon *Commodore* will make available hard drive upgrade kits for the *Amiga 600*. These will vary in capacity and will have to be installed by your dealer or else your warranty is void.

The techy stuff!

The *Amiga 600* is very similar in specifications to that of the *A500+*, apart from the expansions slots. However there are small changes that are worth a mention.

The *A600* has a 8375 *Agnus* chip, this chip is similar to the 8372 *Agnus* chip in the *A3000* and *A500+* as they both let you access a total of 2 megabytes of *Chip RAM*. *Chip RAM* is the RAM that is assessed by the *Amigas* custom chip set. This area of memory is used to store graphics and sound (see article on chip upgrades).

This chip also has some new and interesting feature's one of which relates to the CD ROM drive. The 8375 *Agnus* chip in the *A600* is the only chip to be able to use the CDXL full motion video on the CD ROM drives to its full potential. It also has 8-bit registers for VGA graphics built in. It can calculate and manipulate the 256 colours that this screen mode would enable but can not display them. It may seem strange that it cannot display VGA mode if the registers are built in, but it was done to be compatible with the new *Amigas*. Try this, open the **WBSTARTUP** drawer of *Workbench 2.04* and click on the **MODENAMES** icon once, then use the menu button and select **INFORMATION** from the menus. Now scroll down to the bottom, you will see a 256 colour VGA screen mode is able to be accessed by the

Workbench already.

The new "credit card" slot more correctly known as the PCMCIA slot, is an extremely powerful and versatile slot. The PCMCIA slot is a 68 pin connector that is already a standard interface on palmtops, laptops, notebooks. Any devices that fit in these machines can be used on the *A600* with the correct driver software. The PCMCIA slot is (contrary to popular belief) a far more powerful slot than the side connector on the *A500*.

The SMT chips also mean that the *A600* has a lower current draw so uses less power. This is the main reason the power supply is so much lighter. Also this means that the *A600* is a short step away from a fully fledged laptop. All it needs is an LCD screen and a battery power supply. Already third party developers are working on conversion kits to make the *A600* into a portable *Amiga*.

Commodore has promised there will be many new goodies that will take advantage of the *A600*'s new features over the next year, we will keep you up to date.

Summing up

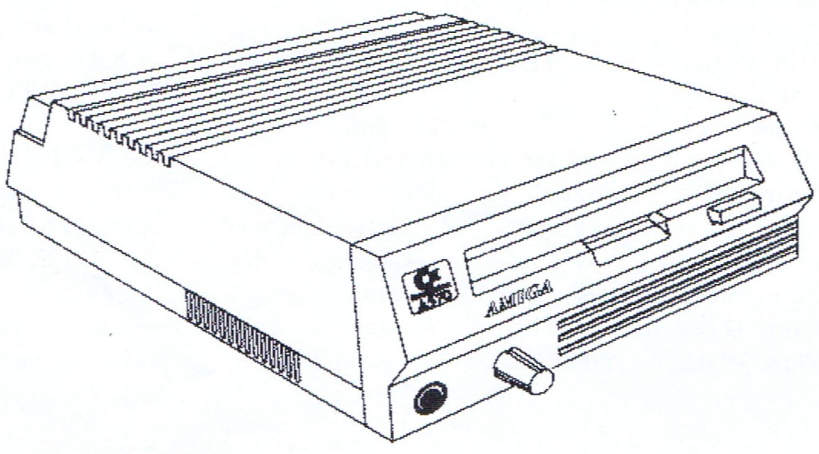
Overall the *Amiga 600* is a powerful, versatile, and cost effective machine that is a worthy replacement of its predecessor the *Amiga 500*, which is to be phased out of production. For anybody who is looking at buying a computer the *Amiga 600* is about the most powerful computer you will find in its price range.

The added ability to be able to cheaply add a hard disk is what *Amiga* owners have wanted for some time. It is the ideal home computer package on the market at the moment. If you have dreams of expanding the *A600* with faster CPU's, 24bit graphics, etc., the *A600* is not the machine for you, but don't worry, there is the rest of the *Amiga* range to suit your needs. However, if you want a computer that has all the features that made the *Amiga 500* New Zealand's most popular home computer plus the added benefit of a hard disk then the *Amiga 600* is the machine you're looking for.

CD ROM drive

CD ROM drives are now finally available for the *Amiga*. There are currently two models, the *A570* for the *Amiga 500* (see picture below) and *A500+* and the *A670* for *Amiga 600* and *Amiga 600HD*, but no confirmed details on CD ROM drives for the *A2000* and *A3000* have been released.

CD ROM drives use CD's like floppy disks, but as CD's can store up to 540 megabytes of data, it enables programs to be more elaborate, and take full advantage of the *Amiga*'s features. For example, the ability to have an entire world Atlas on a disk is invaluable for school projects or even just entertainment. You can look up any country in the world and view maps, see pictures, learn some of the language, read about the country and hear their national music. As CD software is not limited to the small storage space of floppy disks it also allows flight simulators where the ground you fly over is detailed enough to look convincingly like ground instead of green polygon shaped mountains. Also, for all of you who love looking through public domain disks you can now get the entire *Fred Fish Public Domain* collection on CD. With over 700 disks of public domain Programs at your finger tips, with one of these you would never have to worry about finding something to upload to the bulletin boards. There are already many titles available for the CDTV most of which will work on the *Amiga* CD ROM drives as well.



Continued from page 9

Software includes MBR-Test-2, *a comprehensive diagnostic program for* Amiga *memory. The* MBX 1200 *would be useful in any memory intensive and/or math intensive application such as animation, ray-tracing, morphing, scientific calculation and image processing. Power consumption is 200 milliamps (approximate). Configurations available are with 68881 installed, without memory or with any of the four SIMM sizes.* USA suggested retail price: US$189 with 14MHz FPU and 0k memory, *Microbotics.*

ALLADIN 4D

Aspec Programming, the makers of *Draw4D-Pro*, have just released an upgrade *Alladin 4D*. This program is designed for use in both desktop video and desktop publishing applications, although the emphasis is really for the DTV enthusiasts. The name change to *Alladin 4D* is to emphasize its 3-D modelling/rendering program. *Alladin 4D* introduces the following features: Camera/Targets, Timeline, Changes to Textures, Waves, Gases, Display Support, Shadows, EPS Import, Shading Editor and Paths. Direct support is also offered for *DCTV, Firecracker*, Resolver Boards and is one of the first to support the new *OpalVision* board. It requires a minimum of 2Mb of RAM. Suggested Retail $1090.00, *Aspec Programming.*

AD516

Well finally it's here, Sunrize Industries *has just released its 16-bit sound card. The* AD516 *comes bundled with* Studio 16 version 2.0 *editing software. This is the first eight-track audio card available on any platform. It supports stereo with 16 bits of resolution and built in* SMPTE *time code reader for easy synchronization of digital audio to video tape. This will allow almost unlimited sample length when you record, edit and then play back direct to hard disk. The new version of* Studio 16 *not only supports cut, copy and paste, but also provides the advanced options like the* SMPTE *cue list. Drag & Drop technology is also provided for entering sounds into the cue list. The* AD516 *includes a special sound coprocessor, the advanced* 2105DSP, *which allows* Studio 16 *to handle eight tracks while performing real time mixing and can also do high quality 16-bit effects such as flange, delay and chorus. So if you want to add footsteps or door knocks to your video or animation or just add your favorite number and not be stuck with the first take then get into the only eight-track audio card:* AD516. *Suggested retail $3295.00,* Sunrize Industries.

CALIGARI24

Octree Software have done it again with *Caligari*, this time it is a version called *Caligari24*. They state *Caligari24* operates much like the real world, when you can create and manipulate objects in minutes. Not just simple geometric objects but organic deformations, point editing and extrusions can generate anything you can conceive and your models are fully hierarchical. As far as animations go you could animate a battalion of marching soldiers with a few mouse clicks and present it with 16.7 million colours (plus 8-bit Alpha).

Octree, boast of its 3D interface, its features, its speed, its photorealistic rendering and its compatibility (including DXF) with other products. Suggested Retail $895.00, *Octree Software.*

All prices are in NZ$ unless where stated.

ATTENTION AMIGA PROGRAMMERS!

Blitz BASIC 2 is an advanced BASIC compiler and is available now. If you want to produce fast, reliable standalone programs without being confronted by the brain drain of assembler or the verbose nature of C then Blitz 2 is for you.

Our command set encourages structured programming supporting While..Wend, Select..Case, Procedures, Functions, On..Goto etc. Extensive Screen, Window, Gadget and Menu commands allow you to easily take advantage of the Amiga's operating system without typing in pages of code. We've even thrown in a UserInterface designer that will write the code for you!

If you're into games we've added Blitz mode. Closing down the operating system and taking over the machine, we've provided a complete set of highly optimised commands to take your graphics, sound and control systems into overdrive. We've also pushed the BASIC language to a new level of sophistication adding NewTypes (C structures), Linked List Arrays, inline assembler and more. A sophisticated command library management system enables Blitz 2 to grow in leaps and bounds, we've just added ARexx, MED sequencing, Serial Port control and the basics of a 3D rendering system.

We are a New Zealand company, offering extensive local support including a bi-monthly newsletter and Auckland based BBS. To find out more talk to your local software dealer or drop us a line: **Acid Software, 10 St. Kevins Arcade, Karangahape Road, Auckland. Fax 358-1658.**

Formatting Disks

by Nick Divehall

The Workbench is the platform on which we control our Amiga and this column is here for you to unfold its mysteries. Each month we will explore its depths and complexities while trying to help the beginner as well as the expert. So if you have a question you want answered about the *Workbench* here is your chance to have it answered.

Many people who purchase an *Amiga* start word processing or painting, etc., only to find that after they save a few documents their disk is full. This leads them to trying to clear space off their disks which inevitably leads to them deleting a crucial file which renders their favourite program useless. This is the most common problem for beginners, so this month we will investigate the answer.

Data Disks

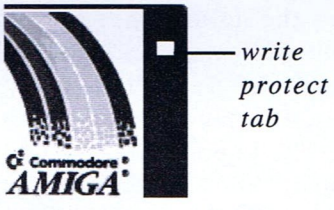
In the initial part of formatting disks there is little difference between using *Workbench 1.3* (*WB1.3*) and *Workbench 2* (*WB2*). I will indicate where any differences occur between the two versions of *Workbench* and I will finish with two separate sections.

What we will do this month is make a data disk to save your files onto. First you will need a blank disk or an old disk you don't need. This disk will become our data disk. Then you will need to format the disk. Formatting the disk organises the disk so that the *Amiga* can store files on it. Formatting can be compared to putting folders in a filing cabinet. Formatting will also delete information previously stored on the disk.

To format a disk first make sure you have booted up from your *Workbench* disk or hard drive. Now place your disk to be formatted into the disk drive. You should now see a disk icon on your screen with **DF0:????** (**DF0:BAD** in *WB1.3*) underneath it. Now take your mouse and move the pointer over to the icon of your blank disk, and click on it ***once*** with your select button (left mouse button). Clicking once on an icon is known as "selecting an icon", and this procedure is used to perform an action on a particular icon whether it be to format a drive or rename a file etc.

When you select the icon, by holding down the menu button, the writing at the very top of the screen (menu bar) will change to **Workbench Windows Icons Tools** (**Workbench Disk Special** in *WB1.3*). Now while still holding down the menu button move your pointer over the **Icons** menu (**Disk** in *WB1.3*). This will trigger what is called a "pull-down menu". Move the pointer down the menu to highlight the **Format Disk. . .** (**Initialize** in *WB1.3*) option then release the menu button. A series of requesters will now appear.

(***WB2* only:** When the first requester appears, click on the **OK** icon with your select button (left mouse button), then a new requester will appear and you should then click on the **Continue** icon.)



write protect tab

If at this stage a requester appears informing you that your disk is **write protected**, then remove the disk and then locate a hole in the top corner of the disk. This is called the **write protect tab**. When you can see through the hole no data can be written to the disk. If you move the black tab over the hole then the disk is known as **write enabled** mean-

ing that data can now be written to the disk. If you now reinsert the disk and click on the **Continue** icon your formatting procedure can continue. Now your disk will be formatted. This can take some time to do, so sit back and rest a while.

Once the disk has finished formatting you will see that its icon now has the label **Empty** underneath it. What you will want to do now is give your disk a name. To do this you will again need to select the disk's icon as you did when you formatted the disk. After this, using your menu button in the same way as before choose **Rename. . .** from the Icons pull down menu. You can now name the disk what you like and when you have finished click on the **OK** icon (in *WB1.3* just hit the enter key).

Now that we have our disk formatted and named we will need to organise the information stored on the disk by adding some drawers. You can think of drawers on the *Workbench* in the same way as folders in a filing cabinet, they organise and divide the files being stored.

Making a drawer is very easy. First move the pointer on top of your disk icon (this can be either a floppy or hard disk) and then double-click on it with your select button. This will open the window of your disk. At the moment the disk is empty so all you will see in the window is the **Trashcan** icon.

At this point *WB2* and *WB1.3* differ for the rest of the process so we will describe each separately. Refer to the appropriate section for the version of *Workbench* that you are using.

Workbench 2

If you look at the menu bar (top border of the window) you will notice that it reads that the disk is 0% full as we have just formatted it.

To make a drawer first make sure that you select the disk window. To do this click on its menu bar (the top part of the window where all the writing is) with the select button. This should turn the border of the window blue. Now holding down the menu button move the pointer to the top of the screen, over the **Window** menu, and move the pointer down until the **New Drawer** option has been highlighted, then release the menu button. A requester will appear with **Unnamed1** as being the name of the drawer so you can use the backspace key to delete this and enter a name for your own drawer. This can be repeated to create a number of drawers. For example you could have a disk for your word processing that has a drawer for letters, reports, faxes, etc.

Now you have created your own disk you will have to learn how to access it from your programs. The requester for each program, to save and open files, will be a little different so the following explanation can vary from program

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Auckland New Zealand

to program.

When you select **Save** or **Open** from your pull down menus you will be confronted by a requester with a number of icons. To access your disk look for the disk drives icon and if you click on this a list of disks should appear among which should be the name of your data disk. Move your pointer on top of your disk's name and double-click. This will bring up a list of your drawers so from there you can then double-click on the drawer from where you wish to save or open your file. Then all you have to do is type the name of your file in the file box and click on the **Save** or **Open** icon.

Now you can store your information in a more organised and orderly way.

Workbench 1.3

To place a drawer on your data disk insert you **Workbench** disk into your disk

drive. Now double-click on the **Workbench** disk and then the **Ram Disk** icon. This will now open up two windows. Locate the **Empty** drawer in your **Workbench** window and move your pointer on top of it then hold down your select button. While still holding down your select button move your mouse so that the **Empty** drawer icon is over the Ram Disk window, then release the select button. This procedure is called "dragging an icon". Now a copy of the **Empty** drawer is in your Ram Disk.

Next we will copy your **Empty** draw onto your data disk. First insert the data disk into your disk drive and then double-click on your data disk icon. Now in the same way we dragged the **Empty** drawer into the ram disk we will now drag the **Empty** drawer from the ram disk to the data disks window. We now have an **Empty** drawer on the data disk. You can now duplicate the **Empty** drawer to create a number of drawers. To duplicate a drawer select the **Empty** drawer icon by clicking on it once with your select button. Then choose **Duplicate** from the **Workbench** pull down menu. This will now create another drawer which you can name by using the same method we used to rename the disks.

By duplicating and renaming the **Empty** drawer we can create a number of drawers. For example you could have a disk for your word processing that has a drawer for letters, reports, faxes, etc. This lets you organise your files in an orderly and organised way.

HELP!

PageStream

I would like to have a search and replace option that would operate multiple times and set a text tag, e.g., to change authors name throughout the article to be set in a certain font and size. I cannot get this to work in *PageStream* or *PageLiner*. Does anybody know how it can be done?

ProDraw3 / AdPro

With the *ProDraw3* Genie for *AdPro* to convert bitmaps doesn't work correctly. I find that only *AdPro* turns on and I have to quit *AdPro* afterwards. Can I access *AdPro* and get back into *ProDraw* without reloading *ProDraw*?

Kerry Bolton, Auckland

If you have anything you are stuck on or can answer one of these letters write to:

HELP!
C/- NZAM
P.O. box 57115
Auckland 1030

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Book Reviews

by Elizabeth Corish

AMIGA FOR BEGINNERS

Author: Christian Spanik
Publisher: Abacus
Price: $52.50 (inc. GST)
ISBN: 0-55755-021-2
Review: Elizabeth Corish

Billed as a practical guide for beginners to using the *Amiga*, this 216 page book has been updated to cover *Workbench 1.3 & 2.0*. Subjects covered are: Complete set-up instructions, backing up diskettes, information on the *Extras* disk, Setting your computer's *Preferences*, customising the *Workbench*, introduction to *AmigaBasic*, *AmigaDOS* Commands, *CLI* tips and short-cuts, creating your own icons, plus information regarding *Preferences 2.0*

The book contains numerous amusing pictures to help keep it 'light', as it is meant for beginners. Machines covered are the *A500, A1000, A2000* and *A3000*. Although those people who have just purchased *A600*'s need not be put off because it is general enough to be still more than useful.

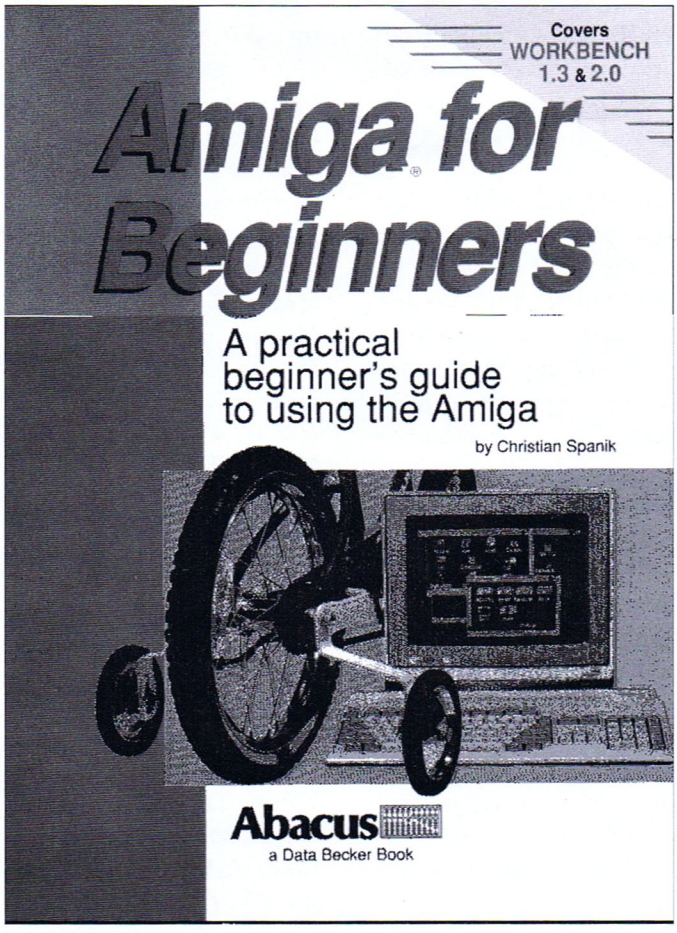
Most chapters are simple, with the book moving along at an easy pace. Although *AmigaBasic* is no longer provided with *Workbench 2.0*, the chapter on *AmigaBasic* has some simple programs which in most cases can convert to another version of Basic such as *Amos* or *Easy Amos* without much trouble.

The section on DOS commands and *CLI* tricks and tips eases the beginner into trying out the various commands. It is usually this area of the *Amiga* that poses the most problems for the first time user and in that sense the book is more than adequate.

There are also some helpful appendices covering possible problems encountered with the appropriate actions required to correct the problem. Also included is a computer glossary to help users become acquainted with all the computer jargon and buzz words.

Last but not least are two sections covering the Icon editor, how to create or alter existing icons, plus a brief description of Hardware internals. In all, *Amiga for Beginners* is an ideal book for first time *Amiga* users, in terms of clarity, depth and user friendliness.

Probably it's only negative feature is that its life span is of a limited nature. But hav-



ing said that, the fact that its simplicity, which will encourage readers to become more confident to try to experiment with other commands and programs, should more than make up for it.

* * *

CORISH'S COMPUTER GAMES GUIDE

Hints, Tips & Pokes for your favourite computer or console 3rd Edition

Author: Corish
Publisher: Kuma Computers
Price: $54.95 (inc. GST)
ISBN: 0-7457-0150-7

How many computer gamesters have been frustrated by losing their last life on the threshold of setting a new high score or completing the whole game? Well, these people can take heart with the release of *Corish's Computer Games Guide*, now into its third edition.

The book began initially out of a need to help their customers when the Corish's ran a computer store which specialized in selling *Commodore* products. Every day they were asked by customers for a hint or 'cheat' for a particular game they were stuck on.

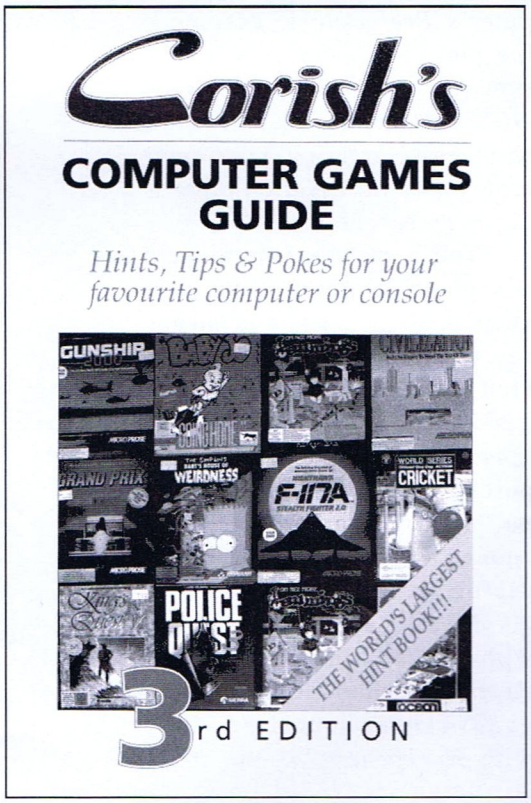
The problem was, as one of the authors stated: "That even if we had one for that particular game in question, we had to try and locate which magazine or book contained it, which is obviously fairly time consuming. Therefore we set about collecting, compiling and editing all the material we had into one source and the *Computer Games Guide* is the final result."

This 800 page guide has just about something for everyone amongst the listings, hints, tips and pokes, with over 1250 games covered including over 200 adventures, and the best thing about it is that it is all in one easily accessed place. Although it is a multi-format book covering 16 bit, 8-bit and consoles, it does have a very large section covering *Amiga* games from adventures to arcade and strategy. Some of the games the book covers are as follows:

Amnesia, Another World, Blues Brothers, Borrowed Time, Chuck Rock, Codename - Iceman, Cruise For a Corpse, Dragons Lair I, Dream Zone, Dungeon Master, Flames of Freedom, Gods, Gold Rush, Guild of Thieves, Heart Of China, Hitchhikers Guide To the Galaxy, Hudson Hawk, Indiania Jones - Last Crusade, Life & Death, Jinxter, Kings Quest I, II, III & IV, Kristal, Kult, Leisure Suit Larry I, II & III, Lemmings, Lurking Horror, Maniac Mansion, Manhunter - New York, Midwinter, Mega Lo Mania, Mindshadow, Oh No! More Lemmings, Pawn, Plundered Hearts, Police Quest I & II, Powermonger, Railroad Tycoon, Secret of Monkey Island I & II, Shadowgate, Shadow Of The Beast I & II, Sherlock Holmes - Riddle Of The Crown, Space Ace I & II, Space Quest I, II & III, Tass Times Tone Town, Twilight Zone, Uninvited, Wonderland, Zak McKracken, Zork I, II, III & Zork Zero. . . and the list goes on and on.

The Guide should prove to be an indispensable item for the serious computer gamester. As a side note, it is interesting to point out that the book was written using an *Amiga 500* with 2Mb of memory and *A590* hard drive. A simple word processor was used, with the files being finally loaded into *PageStream 2.1* for formatting and printing using a laser printer. The final result is very professional and just goes to show what can be achieved using an *Amiga*!

Although it is a multi-format book, i.e., covering from the *Amiga*, *C64*, *PC*, *ST*, through to console games, because of its depth you will find it a worthwhile purchase. Its best feature is the sheer volume of games covered. So, regardless of whether you are a novice or an advanced games player, there should be something inside this book to keep you occupied for hours.



Quick Fractions

by Mark Sibly

AN EASY WAY TO HANDLE FRACTIONS IN ASSEMBLER.

Welcome to the first in a series of articles on assembly language programming for the *Amiga*.

Before we get stuck into this month's topic, let's first outline some of the aims of this column. First I must point out this column is not for the beginner. There is already a plethora of such columns available in many *Amiga* magazines, and a definite shortage of more useful assembly ideas and tricks. Therefore I assume you have a basic knowledge of 68000 assembly language.

If you are just starting out in the world of *Amiga* assembly language, here are a few very informative books I have found:
Amiga System Programmer's Guide volumes 1 & 2 from *Abacus* (very useful!)
Amiga Hardware Reference Manual from *Commodore*
AmigaDos Manual from *Commodore*

Furthermore, not all articles will be *Amiga* dependent. By this I mean that although some articles will only be of use to *Amiga* programmers, many will be of use to programmers overall. This month's article is a good example of this, as the concepts involved are useful in almost any programming situation.

Each month's article will also include a short example program. I will attempt, where ever possible, to keep example programs as self contained as possible. This allows you to type in examples as is. without the presence of any INCLUDE or link files. The example programs are tested on *HiSoft's Devpac* assembler.

And now, to the subject of this month's article. . . A common problem faced by many assembly programmers is that of how to manage fractional quantities within assembly programs. Although the 68000 provides support for 8 data and 8 address registers, these registers are all integer in nature, i.e., they can only contain non-fractional numbers. So how do you go about manipulating fractional values?

Well, one way to achieve this is to use the *Amiga*'s math libraries. These libraries contain functions which perform various mathematical operations such as add, subtract, multiply and divide upon supplied parameters. Values sent to and from these routines are usually either 32 or 64 bits long, depending on the library used, and are set out in a special format. This format contains information about the value's sign (positive or negative), mantissa (the value's actual digits) and exponent (where the decimal point is to appear in the value).

A much simpler, faster and less cumbersome (although less accurate) method is available to assembly programmers for simpler fractional calculations, a method I call 'quick' fractions.

Quick fractions, like the math libraries, also rely on numbers being represented in a special format. Normally, 68000 assembly programmers think about values as being 32 bits long, with no decimal point. In actuality, a decimal point does exist following the value's least significant bit (bit 0). Therefore, the following line of code:

```
Move.l   #5,d0     ;put '5' -> d0
```

Could also be thought of as:

```
Move.l   #5.0,d0   ;put '5.0' -> d0
```

Unfortunately, this is of little use to us because there are no bits to the right of bit 0 for us to enter any fractional value except for '.0'. What if we were to create some bits into which to enter fractional values? Well, we can't exactly create extra bits, 68000 registers will always be 32 bits long, but we can grab some of those 32 bits for the storage of fractional quantities, and

use the rest for the storage of integer quantities. This is the essence of quick, or fixed point mathematics.

SO WHAT!

To use quick fractions, a programmer must decide how many bits are to be used for storing fractional quantities. These bits will always appear in the least significant bits of any values. A favourite set up of mine is to use the low 16 bits of a long word for storing fractional quantities, and the high 16 bits for storing integer quantities. Under this system, any integer may be represented simply by shifting it left 16 times. For example, the value 1 appears as follows:

```
Move.l   #1«16,d0
;use high 16 bits to store the integer '1' -» d0
```

In fact, shifting a value left 16 times is the same as multiplying it by $10000 (or 2^16). This calculation may be used to find the quick representation of any integer or fractional value. For example, to represent one half in quick fractional form, we simply multiply one half by $10000, giving us $8000:

```
Move.l   #$8000,d0   ;a quick '1/2' -» d0
```

Most of the 68000 arithmetic functions may be applied to quick fractions, with the exception of **Mulu, Muls, Divu** and **Divs**, which require dedicated routines. Here is an example of adding 1/2 to 1:

```
Move.l   #$10000,d0  ;'1' in quick form -» d0
move.l   #$8000,d1   ;'1/2' in quick form -» d1
Add.l    d1,d0       ;d1+d0 -» d0 : $18000, or 1 and a
                     ;half, in quick form
```

How about 1 and a half divided by 2:

```
Move.l   #$18000,d0  ;'1 and a half' -» d0
Asr.l    #1,d0 ;d0 shifted right once (divided by 2) -» d0 :
;$c000, or 3/4, in quick form
```

Signed arithmetic is also no problem for quick fractions. Here's an example of adding 1/4 to 1/2:

```
Move.l   #$8000,d0   ;1/2 -» d0
Move.l   #-$4000,d1  ;-1/4 -» d0
Add.l    d1,d0       ;d1+d0 -» d0 : $4000 or 1/4
```

We can also use the 68000 'Neg' instruction to create negative values:

```
Move.l   #$8000,d0   ;1/2 -» d0
Neg.l    d0          ;-d0 -» d0 : -1/2
```

CONVERTING QUICK FRACTIONS

There will usually come a time when a quick number will need to be converted into a 'normal' integer. The following piece of code may be used to achieve this:

```
Asr.l    #16,d0   ;convert quick value in d0 to a
                  ;'normal' integer
```

Or, more efficiently:

```
Swap     d0       ;swap low 16 bits of quick
                  ;value with high 16 bits
Ext.l    d0       ;zap out fractional part
                  ;(now in high 16 bits)
```

How about converting a 'nomal' integer to a quick fraction:

```
Asl.l    #16,d0   ;shift bits up to correct
                  ;'quick' position
```

Or, souped up:

```
Swap     d0    ;put low 16 bits of integer
               ;into quick position
Clr.w    d0    ;clear out low 16 bits (0 -» fractional part)
```

Remember that the system we are using here is only capable of representing fractions as small as 1/65536 and as large as 65535/65536. Also we are limited to integer values from 32768 up to 32767. You can increase the fractional range of quick values by allocating more bits to the fraction, but this will also reduce the range of integers available. Likewise, allocating fewer bits to the fraction will increase the integer range, but decrease the fractional range. Keep in mind that if you use a bit arrangement different from the above 16/16 set up, you will not be able to use **Swap** when converting quick values to and from integers, but will have to use the slower **Asr** and **Asl**.

THAT'S ALL FOLKS

Well, that's it for this month. I hope this information is as much use to you as it has been to me. Once you've fiddled around with quick numbers for a while, they become quite natural and easy to use.

I have included an example program which makes use of quick numbers to bounce 16 dots around an intuition screen. Each dot possesses a x (horizontal) position, y (vertical) position, a x speed and a y speed all of which are maintained using 32 bit quick mathematics.

Look out for a future article revealing quick multiplication and division routines. In the meantime, you may want to have a go at these yourself.

Happy Coding, Mark.

EXAMPLE PROGRAM

```
;************SOME LIBRARY EQUATES*************
OldOpenLibrary  =      -408
```

```
OpenScreen  = -198
CloseScreen  = -66
WaitTOF      = -270
CloseLibrary = -414

;*********MY OWN EQUATE FOR A 'GRAVITY'*******
;************ACCELERATION CONSTANT***********
Gravity = $1000          ;acceleration

;**********NOW FOR THE MAIN CODE*************
     ;pick up exec base
     MOVE.l  4,a6
     ;
     ;attempt to open graphics library
     LEA          GraphicsName(pc),a1
     JSR          OldOpenLibrary(a6)
     MOVE.l       d0,GraphicsBase
     BEQ          Fail1
     ;
     ;attempt to open intuition library
     LEA          IntName(pc),a1
     JSR          OldOpenLibrary(a6)
     MOVE.l       d0,IntBase
     BEQ          Fail2
     ;
     ;attempt to open an intuition screen
     LEA          MyNewScreen(pc),a0
     MOVE.l       IntBase(pc),a6
     JSR          OpenScreen(a6)
     MOVE.l       d0,MyScreen
     BEQ          Fail3
     ;
     ;find a bitplane to write to
     MOVE.l       MyScreen(pc),a0
     MOVE.l       192(a0),MyBitPlane
     ;
     ;prepare dots array
     LEA          Dots(pc),a0   ;start of array
     MOVEQ        #15,d7        ;number of elements
     MOVE.l       #0<<16,d0     ;initial x position - quick
     MOVE.l       #16<<16,d1    ;initial y position - quick
     MOVE.l       #$2000,d2     ;initial x speed - quick
     MOVE.l       #0<<16,d3     ;initial y speed - quick
PrepDots:         MOVE.l  d0,(a0)+        ;add x to array
     MOVE.l       d1,(a0)+      ;add y to array
     MOVE.l       d2,(a0)+      ;add x speed to array
     MOVE.l       d3,(a0)+      ;add y speed to array
     ADD.l        #16<<16,d0    ;create a new x position
     ADD.l        #4<<16,d1     ;create a new y position
     ADD.l        #$1000,d2     ;create a new x speed
     ADD.l        #$800,d3      ;create a new y speed
     DBF          d7,PrepDots   ;loop until all dots done
     ;
Main:                           ;wait for vertical blank
     MOVE.l       GraphicsBase(pc),a6
     JSR          WaitTOF(a6)
     ;
     ;move all the dots
     LEA          Dots(pc),a0   ;start of array
     MOVEQ        #15,d7        ;number of dots to move
MoveDots:
     MOVE.l       (a0),d0       ;x position - quick
     MOVE.l       4(a0),d1      ;y position - quick
     SWAP         d0            ;convert x to integer
     SWAP         d1            ;convert y to integer
     BSR          PixelOff      ;erase previous position
     ;
     ;move dot along x axis
     MOVE.l       (a0),d0       ;dot x position
     ADD.l        8(a0),d0      ;add x speed
     CMP.l        #320<<16,d0   ;still on screen?
     BCS          DotXOK        ;branch if yes - OK
     MOVE.l       (a0),d0       ;pick up old x
     NEG.l        8(a0)         ;reverse x speed
DotXOK:
     MOVE.l       d0,(a0)       ;store new x position
     ;
     ;add gravity to speed
     ADD.l        #Gravity,12(a0)
     ;
     ;move dot along y axis
     MOVE.l       4(a0),d1      ;pick up y position
     ADD.l        12(a0),d1     ;add y speed
     CMP.l        #200<<16,d1   ;still on screen ?
     BCS          DotYOK        ;branch if yes - OK
     MOVE.l       4(a0),d1      ;pick up old y
     NEG.l        12(a0)        ;reverse y speed
DotYOK:
     MOVE.l  d1,4(a0)           ;store new y position
     ;
     ;plot dot in new position
     MOVE.l       (a0),d0       ;pick up x
     MOVE.l       4(a0),d1      ;pick up y
     SWAP         d0            ;convert x to integer
     SWAP         d1            ;convert y to integer
     BSR          PixelOn
     ;
     ;on to next dot
     LEA          16(a0),a0
     DBF          d7,MoveDots   ;loop until all dots
                                ;done
     ;
     ;exit if mouse click
     BTST         #6,$bfe001
     BNE          Main
     ;
     ;close screen
     MOVE.l       IntBase(pc),a6
     MOVE.l       MyScreen(pc),a0
     JSR          CloseScreen(a6)
     ;
Fail3:         ;close intuition library
     MOVE.l       4,a6
     MOVE.l       IntBase(pc),a1
     JSR          CloseLibrary(a6)
     ;
Fail2:          ;close graphics library
     MOVE.l       4,a6
     MOVE.l       GraphicsBase(pc),a1
     JSR          CloseLibrary(a6)
     ;
Fail1:          ;exit from dots!
     MOVEQ        #0,d0
     RTS
;************** SUBROUTINES *************
PixelOn:         ;plot a pixel - d0.w = x, d1.w = y
     MULU         #40,d1
     MOVE         d0,d2
     ASR          #3,d0
     NOT          d2
     MOVE.l       MyBitPlane(pc),a1
     ADD.l        d1,a1
     BSET         d2,0(a1,d0)
     RTS
PixelOff:        ;erase a pixel - d0.w = x, d1.w = y
     MULU         #40,d1
     MOVE         d0,d2
     ASR          #3,d0
     NOT          d2
     MOVE.l       MyBitPlane(pc),a1
     ADD.l        d1,a1
     BCLR         d2,0(a1,d0)
     RTS
;************** DATA ******************
Dots:            Ds.b    16*16
GraphicsName:    Dc.b    "graphics.library",0
     Even
GraphicsBase:    Ds.l    1
IntName:         Dc.b    "intuition.library",0
     Even
IntBase:         Ds.l    1
MyNewScreen:     Dc      0,0,320,200,1
     Dc.b        1,0
     Dc          0,15
     Dc.l        0,MyTitle,0,0
MyTitle:         Dc.b    "Bouncing Dots via Quick Fractions",0
     Even
MyScreen:        Ds.l    1
MyBitPlane:      Ds.l    1
```

Virtual Art

by Dudley Story III

Welcome to the first installment of Virtual Art, a column to help you create your own art graphics on the Amiga. As the world's first multi-tasking home computer with 12-bit colour, introduced in 1986, the Amiga has remained an exciting, affordable tool for computer graphics. It is the choice of designers and artists worldwide. Over the next few months I'll be explaining how to take advantage of its full potential for your own artistic endeavours, from creating titles for desktop publishing to 3D fantasies.

You've probably seen games or demos on the *Amiga* that knocked your socks off with their visual effects. **Anything you see on an Amiga can be done at home.** Often the professional has the advantage of using a faster model with more RAM and tools like scanners, drawing boards and programming techniques, but the basic Amiga design that he works with is the same as the computer sitting in your home or office. Anything that he creates you can too, with patience and skill. Anything that appears on the Amiga screen (with the exception of displays from add-on graphics boards) is in one of four displays :

Lo-Res (320 x 256)
Medium Res (640 x 256)
Interlace (320 x 512)
Hi-Res (640 x 512)

Amiga's with the *Super Denise* chip also have the option of a **Super High Res** display of 1280 x 200 or 1280 x 400. Since this mode can only display four colours at once, it is more suited for desktop publishing purposes, and we will ignore it for the time being.

If you put your nose against your computer screen, or television, you will see that the display is made up of tiny dots, called "pixels" from **pix** (for picture) **el**ements. These pixels are crammed together to create the illusion of a continuous surface. A Lo-Res screen, for example, is a grid 320 pixels wide and 256 pixels high. The more pixels on the screen, the greater the resolution and the more detail can be placed on your "electronic canvas". A picture in Interlace mode is finer and less chunky than one in Lo-Res with fewer pixels. However, *Amiga* computers without extra hardware suffer from flicker in the Interlace and Hi-Res mode. This is not a fault, it's just that the standard monitor supplied with the *Amiga* cannot refresh the screen fast enough in Interlace mode, creating a flickering image. The only sure-fire solution is to buy a monitor with a higher scan rate, called a multisync, and a hardware interface. Such "flicker-fixer" solutions are available for every model.

For an artist on the *Amiga* the colour palette is varied and user-definable. You can paint in any single mode with 2, 4, 8 or 16 colours. Any mode other than Hi-Res, you can use 32 colours or one of two special modes. One, called **EHB,** for **E**xtra **H**alf **B**right, supplies 64 colours. The first 32 are definable, while the second 32 are half the value of their component pair, that is, darker by half. If one of your colours is pure white, its component pair in the second row of 32 will be a medium gray, i.e., between white and black.

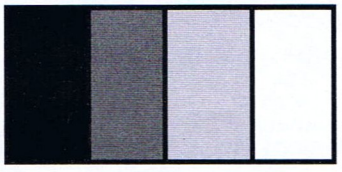


figure 1

The second special mode is **HAM**, for **H**old **A**nd **M**odify, in which you can use every register of the Amiga's 4096 colours. HAM graphics are usually the most stunning *Amiga* images, but they are rarely used in games.

The reasons behind this

are quite complex. Suffice to say that the colour of each pixel on the HAM display is dependent on the colour of the pixel to its immediate right, meaning that it can take a maximum of three pixels horizontally across the screen to change a pixel's colour value (figure 1).

This causes characteristic "fringing" in a HAM painting, but this drawback can be an advantage. No matter how close the pixels are on a monitor screen, a straight 45° line will look like a "staircase". (Magnified in figure 2).

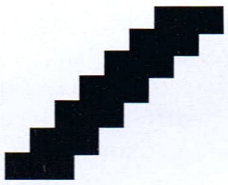


figure 2

By shadowing the line with shades closer to that of the background colour, its apparent "jaggedness" can be reduced (figure 3).

The Amiga does this automatically in HAM mode, and many 3D programs use this "anti-aliasing" technique to smooth the borders of objects with their background. *DPaint* IV sometimes attempts to avoid the fringing problem by changing the colour under the "brush" to the nearest hue that will not upset the colours of the pixels next to it. For example, a pure red may be pushed to pink or magenta to blend more harmoniously with the pixels around it. Despite this small disability, HAM pictures are still the most stunning on the Amiga, and many original artworks have been created in this mode. Those searching for inspiration need look no further than Rick Parks, an American *Amiga* artist whose work is captured on the popular public domain Fish disks, specifically number 426.

As a painter mixes the paints on his palette to achieve the correct hue, so too the artist on the *Amiga* has a means of mixing and selecting colours to use on his electronic canvas, but with greater flexibility.

Most paint programs use an "**RGB**" or "**HSV**" selection system to help you create colours. Most people know that many colours can be created from a combination of the component colours **R**ed, **G**reen and **B**lue. Red and green, for example, combine to make yellow. An RGB selection system creates colours in just that way, by mixing various levels of red, green and blue like pigments on a palette. A **HSV** system uses the components of **H**ue, **S**aturation and **V**alue to create colours in a different way. "Hue" refers to the range of colours we are familiar with in the rainbow. "Saturation" is the *amount* of colour in the mix. "Value" or "Luminosity" refers to the *intensity* of colour.

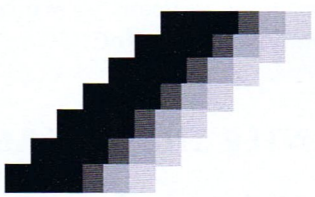


figure 3

The best way to understand how these systems work is to play around with them. *DPaint IV*, for example, gives users access to both systems, so that one can switch between the two, seeing how the same colour is registered in both systems. This is the first place where any basic artistic knowledge of colour theory is an advantage, but not absolutely necessary.

As the resolution and number of colours used increases, so do demands on the computer. Any Amiga can display a HAM picture, but you may find that your computer slows down during complex painting operations. Complex animations can also slow down the computers display, making it sluggish. To avoid **Out of Memory** warning, plan how many colours you will need in advance and try to keep them to a minimum. Decide what resolution you will use. Interlace is preferred if you plan to transfer your work to video, but lower resolutions still look effective on a monitor screen with careful planning. If memory is getting squeezed, try keeping your brushes small.

That's the end of my column for now. In the next issue I'll be discussing how you can express your artistic vision through the Amiga, with helpful tips and techniques. I'll start with ways to make your time with the most popular *Amiga* paint program, *Deluxe Paint*, easier and more enjoyable, along with ways to improve your animations. In following columns I'll move onto other paint and image manipulation programs, as well as 3D and animation packages.

Dudley Storey III is a free-lance computer artist/ animator working with television and ad agencies. His most recent contract was an animation for Bars Leaks.

How Computers Count

An Introduction to Number Systems

by Mark Sibly

Welcome to the NZAmiga Beginner's column. This column will attempt to explain various computer fundamentals, and hopefully clear up some of the gobbledy-gook which can often prove confusing to newcomers to the world of computers.

Each article will also include a few example problems you may want to have a go at. The answers will be given at the end of each article.

This month's column will deal with number systems. Although a knowledge of number systems is not vital to operate a computer, it can help explain how a computer "thinks", and is necessary for anyone wanting to get into programming. It's also nice to be able to throw around words like bits, bytes and bus, AND know what you are talking about.

What is a number system? A simple but not very explanatory definition of a number system might be, "a system, or set of rules, which allows quantities to be measured and/or recorded."

Let us now journey back to prehistoric times to have a look at how the very first number system may have come about...

THE ADVENTURES OF UGH (Bsc Hons; RIP)

Ugh was out hunting one day when he came across a small herd of mammoths. Realising that he, alone, was no match for such mighty creatures, he decided to head back to the village to get help.

Arriving back home, he managed to communicate the fact that lunch was not going to be a problem for a while to come. Then, to prove his point, he picked up a stick and scratched 7 marks in the ground - one scratch for each mammoth.

The villagers were suitably impressed, the hunt was highly successful, and Ugh went on to develop the very first model of the universe. But, what is more important, the villagers now possessed a means by which to communicate quantities.

ENTER THE ROMANS

Ugh's number system, although simple, was perfectly adequate for the village's needs. However, as the centuries passed, limitations in Ugh's system became apparent. As civilisation progressed, the need to express very large quantities arose. Ugh's system was great when dealing with smallish amounts, but when it came to haggling over how many gold pieces a chariot was going to set you back, it was, to say the least, impractical. What was needed was a system which allowed large quantities to be expressed using fewer scratches.

One way to achieve this is to use different shaped scratches to show different amounts. Then, any quantity can be broken down into combinations of these symbols and recorded as such. This is exactly the system the Romans hit upon.

Under the Roman system (also known as Roman Numerals), various symbols are assigned various amounts. Here is a brief look at some of these symbols and their meanings:

I = 1
V = 5
X = 10
L = 50
C = 100
D = 500
M = 1000

Symbols are combined additively to represent amounts. For example, VI represents the amount 6 (5 plus 1), while XVII represents 17 (10+5+1+1). To reduce the amount of writing required even further, another rule was also added: Whenever a symbol representing a smaller amount appears before a symbol representing a larger

amount, the smaller amount is subtracted from the larger. For examples, instead of using IIII to represent 4, you could use IV (1 subtracted from 5). Similarly, IX represents 9. Time for a quick exercise: See if you can figure out what amount MCXCIV represents.

EXIT THE ROMANS

For all their elegance, Roman numerals still suffered one major drawback, and that was in the calculation department. Complex rules were created for such operations as addition, subtraction and multiplication, but it soon became apparent that, for the mathematicians at least, roman numerals just couldn't cut it. So came about the number system we use today - the decimal system.

THE DECIMAL NUMBER SYSTEM

The word decimal comes from the Greek word deka meaning 10. Words such as decathlon and decimetre (one tenth of a metre) also borrow from this word.

As with roman numerals, the decimal number system also uses different shaped symbols to represent different amounts. The decimal system uses 10 such symbols (digits).

Although we are all familiar with the decimal number system, it's worth going over the basics again, especially for those of us for whom school days are nothing more than a vague memory.

A number expressed using the decimal system contains a series of one or more digits. Each digit is said to appear in a certain column, depending upon how far from the right of the number it is.

For example, the number 784 has three columns. The 4 appears in the first column, the 8 in the second column and the 7 in the third column.

With digits in the first (rightmost) column, there is no problem. The 4 in the above example simply means 4. However, digits in other columns must be multiplied by increasing powers of 10, i.e. digits in the second column must be multiplied by 10^1 (10^1) =10; digits in the third column must be multiplied by 10^2 (10^2) =10x10, or 100); digits in the fourth column must by multiplied by 10^3 (10^3) =10x10x10, or 1000 and so on.

Once a number's digits have been multiplied by the correct power of 10, the results are added up and the number's real value is arrived at. So, we can break down 784 as follows :

(7x10^2) + (8x10^1) + 4 =
(7x100) + (8x10) + 4 =
784

Whew! It all sounds complex, but it is a process we subconsciously carry out all the time.

WHY DECIMAL?

As mentioned above, the decimal system uses 10 symbols, or digits. Why 10? Well, the word digit comes from a Greek word meaning finger! Early mathematicians probably decided to use 10 digits as this gave them access to a simple calculator by way of their hands.

However, let's say that humans had evolved with only one arm. Not only would we look decidedly unusual, but we would only have 5 fingers. In this case, we probably would have developed the pentamal number system instead of decimal.

Let's have a quick think about the ramifications of this hypothetical pentamal system. First, there would only be 5 symbols available to express numbers with - 0,1,2,3 and 4. This would mean that numbers such as 784 would never even exist in the pentamal system, as the digits 7 and 8 can not be used. Secondly, instead of using powers of 10 to multiply columns by, we would use powers of 5. For example, let's consider the number 341. This number can be broken down in decimal as follows:

(3x10^2) + (4x10^1) + 1 =
(3x100) + (4x10) + 1 =
341

However, we can also break down this number using the pentamal system as follows:

(3x5^2) + (4x5^1) + 1 =
(3x25) + (4x5) + 1 =
96 decimal

Therefore, the number 341 pentamal equates to 96 decimal. Try figuring out what 10 would represent in the pentamal system. How about 1342?

The mathematical name for the decimal number system is base 10. Similarly, the mathematical name for our pentamal system is base 5. Can you work out what base Ugh's number system was?

There is no limit to the variety of available number bases, they range from base 1, base 2, base 3, up to base infinity. However, not all number bases are that practical to use. Let's say we are using base 100. Although this would mean we would require short sequences of digits to express very large values, we would need 100 different kinds of digits. Similarly, a base 2 number system would have only 2 different digits, but would require a large sequence of digits to express large quantities.

HOW MANY FINGERS DOES AN AMIGA HAVE?

So, the base 2 number system is useless, is it? Well, not quite. It is so useful, we are going to have a closer look at it!

For a start, the base 2 number system is usually referred to as binary. When people talk about binary numbers, they are really talking about base 2 numbers.

Binary numbers have only 2 digits available - 0 and 1. The digits 3, 4, and 5 never appear in binary numbers. The binary digits 0 and 1 are often referred to as bits.

The columns in binary are powers of 2 (2^1, 2^2, 2^3...) instead of decimal's powers of 10.

So the number 100 in binary can be broken down as follows:

(1x2^2) + (0x2^1) + 0 =
(1x4) + (0x2) + 0 =
4 decimal

and the binary number 10110 (see Table on page 49)

(1x2^4) + (0x2^3) + (1x2^2) + (1x2^1) + 0 =
(1x16) + (0x8) + (1x4) + (1x2) + 0 =
22 decimal.

Have a go at working out what the binary number 110110 is in decimal.

As you can see from the above examples, binary numbers are usually long strings of 0's and 1's which are very cumbersome to deal with. Why then are we bothering with them at all? Well, it all has to do with how a computer handles numbers.

Numbers are stored and manipulated inside a computer using a system known as digital logic. A good way to imagine digital logic is to think of a light bulb connected to a battery by way of a switch. When the switch is closed, the light turns on. When the switch is open, the light goes out. It's obvious that the light bulb can be in one of two possible states, either on or off, and never be in both states at once. The idea of digital logic is to think of one of these states as a binary 0 digit, and the other as a binary 1.

So with one battery, one switch and one light bulb, we are able to express either a 0 or 1. Now, let's say we can connect 4 batteries to 4 light bulbs, each with its own switch. We could then assign each battery-switch-light bulb combination it's own binary column, and be able to express a wider range of numbers. Can you work out just how many?

This is the basic idea behind digital logic. Numbers are sent through the computer's circuits on groups of wires in binary form. A group of such wires is known as a bus. A wire with current (electricity) flowing through it represents a binary 1, and a wire with no current, a binary 0. Each wire on a bus represents a separate binary column.

The number of wires used to send numbers around a particular computer partially reflects the computer's power. For example, the old 6502 based computers (e.g., *Commodore 64*) used an 8-bit bus (8 wires) to send data along. This meant that only binary numbers of 8 binary digits (bits) or less could be handled at one time. This is where the term 8-bit computer comes from. The *Amiga 500*, however, uses a 16-bit bus, and the *A1200*, *A3000* and *A4000* use a bus size of 32-bits.

So just how does a computer's bus size relate to it's power. On the old 8-bit computers, we can calculate that an 8-bit bus is capable of handling numbers from 0 through to 255. To manipulate numbers outside this range, we must break larger numbers down into smaller chunks which will fit onto the bus, and send these chunks down the bus one at a time. Therefore, numbers larger than 255 take at least twice as long to move around an 8-bit computer.

However, a 16-bit computer's bus is capable of handling numbers from 0 through 65535, allowing much larger numbers to be sent down the bus in one hit, and it's only when we want to start dealing with numbers larger than 65535 that we must start breaking numbers down into bus sized chunks.

Computers with larger bus sizes are therefore capable of handling larger numbers with more speed. This is the main relationship between a computer's bus size and it's processing power.

HEXADECIMAL

The last topic we'll have a quick look at in this month's article is the hexadecimal number system.

Hexadecimal is a fancy name for the base 16 number system. Hexadecimal is a popular number system used mainly by programmers. Being itself a power of 2, base 16 is fairly easy to convert to and from binary. Also, hexadecimal allows numbers to be written down much more economically than binary, as one hexadecimal digit represents four binary digits.

Having already covered a variety of number systems, I'll leave it up to you to work out the mechanics of hexadecimal. However, there is one intriguing property of hexadecimal which is worth having a look at.

We already know that the base of a number system dic-

tates how many symbols (or digits) are available in that number system. So far, with our base 5 and base 2 systems, we have simply borrowed symbols from the decimal system. However, if we want to use base 16, we run into a problem - we need 16 different symbols, and there are only 10 to borrow from decimal! Therefore, we need to come up with 6 extra symbols to use.

To achieve this, hexadecimal uses the 10 decimal symbols to represent quantities 0 through 9, and the symbols A, B, C, D, E and F to represent the quantities 10 through 15, respectively.

Due to this mix of alphabetic and numeric symbols, hexadecimal numbers often take on a rather peculiar appearance. It's possible to end up with numbers which contain only letters, and no digits - for example, FACE is a perfectly legal hexadecimal number! Can you work out just what this equates to in decimal?

SOME JARGON

Well, that about wraps it up for this month. If you have any questions relating to either this article, or anything to do with computers in general, please feel free to write 'em down and post 'em in, and I'll have a go at coming up with some intelligent answers.

Anyway, I'll leave you now with a few computerese words with which to impress your friends.... Bye!

BINARY - the base 2 number system. Binary numbers are often denoted by a % prefix - e.g. %1010 = 10 decimal.

HEXADECIMAL - the base 16 number system Often abbreviated to hex. Hex numbers are often denoted by a $ prefix - e.g.: $F = 15 decimal.

BIT - a binary digit; either 0 or 1.

BYTE - a number consisting of not more than 8-bits.

WORD - a number consisting of not more then 16-bits.

LONG WORD - a number consisting of not more then 32-bits.

BUS - a group of wires along which pulses representing binary digits are sent. The number of wires represents the bus size. For example, a 32-bit bus consists of 32 wires.

DIGITAL LOGIC - a term which describes the binary system used internally by computers.

ANSWERS TO PROBLEMS

1) MCXCIV =
1000+100+90+4 =
1194.

2) 10 pentamal =
(1x5^1)+0 =
(1x5)+0 =
5+0 =
5 decimal

1342 pentamal =
(1x5^3)+(3x5^2)+(4x5^1)+2 =
(1x125)+(3x25) +(4x5)+2 =
125+75+20+2 =
222 decimal

3) Ugh was the proud father of the base 1 number system.

4) 110110 binary =
(1x2^5)+(1x2^4)+(0x2^3)+(1x2^2)+ (1x2^1)+0 =
(1x32)+(1x16) +(0x8)+(1x4)+(1x2)+0 =
32+16+4+2 =
54 decimal

5) 4 binary digits can represent 2^4 (2x2x2x2) or 16 possible values. These values range from 0 through 15, inclusive.

6) FACE hexadecimal=
(15x16^3)+(10x16^2) +(12x16^1)+14 =
15x4096+10x256 +12x16+14 =
61440+2560+192+14 =
64206

Table of base numbers in columns

column # (*n* is any base number)	6	5	4	3	2	1
	n^5	n^4	n^3	n^2	n^1	n^0
	n^5	*n*^4	*n*^3	*n*^2	*n*^1	*n*^0
	*n*3 and *n*^3 means *n* to the power of 3 or *n* x *n* x *n*					
decimal multiply by	10^5 100,000	10^4 10,000	10^3 1,000	10^2 100	10^1 10	10^0 1
pentamal multiply by	5^5 3,125	5^4 625	5^3 125	5^2 25	5^1 5	5^0 1
binary multiply by	2^5 32	2^4 16	2^3 8	2^2 4	2^1 2	2^0 1
hexadecimal multiply by	16^5 1,048,576	16^4 65,536	16^3 4096	16^2 256	16^1 16	16^0 1

Example: 10110 binary = (1x2^4) + (0x2^3) + (1x2^2) + (1x2^1) + 0 = (1x16) + (0x8) + (1x4) + (1x2) + (0x1) = 22 decimal

Skotty Explains:

Custom Chip Set Upgrades

by Scott Gardiner

I am writing this column with the hope that it will aid the average user to gain a full understanding of the Amiga from a hardware perspective. I will cover various hardware topics of the *Amiga* in monthly articles and will also welcome ideas on what you would like to read about.

Introducing yourself is never easy so I'll keep it brief. Currently, and for the last two years, I have been working as the Service Manager for a computer repair firm in Auckland, specialising in the *Commodore Amiga* range of computers. Before this I was employed as an engineer for *Commodore Business Machines*. Over the years I have built up a reasonable knowledge of the *Amiga* computer and I hope to be able to pass this on to *Amiga* users giving them a better understanding of the machine.

In this month's article I will describe the various chip upgrades that are available and the enhancements gained for the *A500/B2000* series of *Amiga*s. If there is enough interest for an article on chip set upgrades for the other machines in the *Amiga* series (e.g., *A1000 / A2000 / A3000 / A600*), or this article isn't in depth enough for many users, I will produce one at a later date.

There are three main custom chip upgrades available for the *Amiga 500*'s and *A2000's*. These are the *Agnus*, *Denise* and *Workbench* ROM chips, each of which give different enhancements to the Amiga.

AGNUS

The *Agnus* chip in the *A500's* and the *A2000' s* controls various functions inside the machine, such as generating all the system clocks. This also includes the main 68000 CPU clock, controlling the 25 DMA channels, Bit Blitter control for high speed animation, memory control of Chip RAM and Fast RAM, as explained later. Basically the *Agnus* chip can be thought of as a second processor for want of a better description.

The *Agnus* chip has undergone a number of changes in the *Amiga* over recent years, with the major enhancement being the capability to increase the size of the chip memory. This is memory used by the system for various functions such as video display. Chip memory is not to be confused with total memory available on the *Amiga*. For those users with a background in *IBM* machines, chip memory on the *Amiga* can be thought of as base memory on an *IBM* machine. Thus on an *IBM* machine once the 640K barrier has been reached any additional memory is configured as extended memory. This principle is the same on the *Amiga*, once the chip memory barrier of the *Agnus* chip is reached any additional memory is configured as what is termed Fast memory.

The first *Agnus* chips in the *A500* and *B2000* were the 8370 (NTSC) or the 8371 (PAL). These chips had the capability of addressing 512 kilobytes of chip memory and an additional 8.5 Megabytes of memory as Fast memory. Only being able to have 512 kilobytes of chip memory did have its limitations, for example if you were using *Deluxe Paint* (a graphics painting and animation program) and a high resolution screen of 640 x 512 pixels was selected then you only had available 2 colours because the *Amiga* ran out of chip memory. The next *Agnus* chip for the *A500*'s and *B2000*'s was the 8372A (NTSC or PAL). This *Agnus* was capable of addressing up to 1 Megabyte of chip memory, double the size of its predecessor. This *Agnus* had the capa-

bility of delivering 16 colours on a high resolution screen of 640 x 512 pixels in a program such as *Deluxe Paint*. Increasing the amount of chip memory in the machines also allowed many other packages such as *Professional Page,* to run considerably more effectively without the dreaded "out of memory" error appearing. This particular upgrade is a must for all those users involved in a lot of spreadsheet, graphics, or desktop publishing work but it will not be to great advantage for those users just using their machines for games.

Recently the *Amiga 500+* and *Amiga 600* computers have been released with yet another new *Agnus* chip incorporated into their architecture. This *Agnus* chip is an 8375 (NTSC or PAL) and is capable of addressing 2 Megabytes of chip memory, again double the capacity of its predecessor. Because of this enhancement the *Amiga 500+* series of computers are expandable to a total memory of 10 Megabytes comprising of 2 Megabytes of Chip RAM and 8 Megabytes of Fast RAM, not a total of 9 Megabytes as in the *A500*'s and *B2000*'s.

After reading this and thinking "I could do with some more chip memory" the first thing to do is to find out what sort of *Agnus* chip you have in your machine. The easiest way to tell on an *Amiga 500* is to remove the expansion door to the left of the machine, FIRST TURNING THE POWER OFF! When you look at the exposed expansion edge connector if all the copper slats are of the same size you have a revision 6A board with the 8372A 1 Megabyte *Agnus* chip. All that is required to upgrade your machine to 1 Megabyte of chip memory is a 512 Kilobyte memory expansion in the bay under your *Amiga 500*, and a trip to your local Authorized *Commodore* Service Centre for several minor board modifications. If the expansion edge connector in your *Amiga 500* doesn't have slots all of equal size but has a larger copper slat at one end then you have a revision 5 or earlier board. To upgrade your machine to 1 Megabyte of chip memory you will require an 8372A *Agnus* chip fitted to your machine and again the same requirements as for the revision 6A board to upgrade the machine.

The *Amiga 500+ Agnus* chip (8375) will NOT work in a standard *Amiga 500* as the pin configuration is different and an extra address line has been added to enable the *Amiga 500+* to address 2 Megabytes of chip memory. This means that the standard *Amiga* 500 only has the capability of addressing up to 1 Megabyte of chip memory, although there are several third party suppliers which do have adapter boards such as the MegAChip board to allow the *Amiga 500* user to run the *A3000* 2 Megabyte *Agnus* in their machines.

The only way to tell which *Agnus* chip you are using in the *Amiga B2000* machines is by removing the cover. Therefore it is recommended that you consult your local Authorized *Commodore* Service Centre. The same theory applies as to the *Amiga 500 Agnus* upgrades although *B2000* users will not need an additional memory expansion as they have 1 Megabyte of memory on board, but not necessarily configured as all chip memory. There is a simple way for both *A500* and *B2000* users to see if their machines are already configured with 1 Megabyte of chip memory. Just boot up off a workbench disk and double click on the shell icon and type the command "avail" in the shell and this will reveal the memory configuration.

DENISE

The *Denise* chip in the *Amiga 500's* and *B2000*'s is the chip which controls predominantly video functions such as managing 8 sprite controllers, displaying the screen in various resolutions via the video hybrid chip and generating the *Amiga's* 4096 colours on a TV or RGB monitor. The *Denise* chip also controls the movement of the mouse and joystick ports. The *Denise* chip in the standard *Amiga 500*'s and *B2000*'s is an 8362, capable of screen resolutions up to 640 by 512 pixels.

With the release of the *Amiga 3000, A500+*, and *A600* a new enhanced *Denise* chip called an 8373 (version 4) has been released. The 8373 will allow much greater screen resolutions, up to 1280 x 512 pixels on a standard *Commodore* 1084 monitor although you will need to be using the *Workbench 2.0* ROM and software as described later in this article to enjoy the full benefits of the new *Denise* chip. Greater screen resolutions than 1280 x 512 pixels are also available by using the new *Denise* chip although hardware devices such as a flicker fixer card and a multisync monitor are required. It should also be noted that without the added hardware such as the flicker fixer card and multisync monitor on the stan-

dard *Amiga 500*'s and *B2000*'s the display may flicker when operating in resolutions with interlace.

The enhancements the new 8373 *Denise* chip, when coupled with a *Workbench 2.0* ROM and the upgraded *Agnus* chip give, particularly for graphics applications are enormous and you will be able to achieve picture clarity you never thought possible on the *Amiga* computer. The 8373 *Denise* chip will operate in both the *Amiga 500*'s and *B2000*'s under *Workbench 1.3* or *Workbench 2.0* although again it is recommended that you consult your local Authorized *Commodore* Service Centre to have this upgrade fitted.

WORKBENCH ROM

The *Workbench* ROM chip in the *Amiga 500*'s and *B2000*'s contains kernel and DOS routines (the basis of any operating system), as well as performing the power up procedure and diagnostics on the machine. As the user you will notice that the Amiga goes through various stages of gray on power up. This is the onboard diagnostics built into the ROM chip performing it's system checks, and once completed it will bring up the appropriate prompt depending on the version of ROM chip installed in the machine.

Until the release of the *Amiga 500+* the latest version of ROM and software was *Workbench 1.3*. There are quite a number of new enhancements gained by using the *Workbench 2.0* ROM chip and software. Some of which being a number of new pull down menus, full support of the new chip set (e.g., the *Denise* chip) allowing much higher screen resolutions and *ARexx* support. Also a number of commands previously held on the Workbench disk under *Workbench 1.3* have been moved into the *Workbench 2.0* ROM chip. One other major enhancement being the Fast File System built into the chip and therefore it doesn't need to be loaded from disk, thus saving valuable disk and memory space. There are a variety of other enhancements too numerous to mention but which can be found in the *Workbench 2.0* operating manuals.

The *Workbench 2.0* ROM upgrade in my opinion would have to be one of the wisest moves an *Amiga* user could make. It is the entire *Amiga* operating system enhanced and the majority of software from business and desktop publishing right through to games is now all being produced with *Workbench 2.0* and its enhancements in mind to finally unlock the true power of the *Amiga* computer.

The *Workbench 2.0* ROM will operate in both the standard *Amiga 500*'s and *B2000*'s, although it pays to give some thought to the software aspect of this upgrade. The odd program which you are possibly running, particularly some earlier games were written under *Workbench* and ROM version 1.3 or 1.2, may have trouble running under *Workbench 2.0*. To get around this problem many service centres are supplying *Workbench* ROM switching devices to allow you to operate both *Workbench 1.3* and *Workbench 2.0* ROM's in your machine at the same time. These devices are operated by holding down the left mouse button on power up to select between either *Workbench* ROM. In my opinion these switching devices are worthwhile considering when looking at performing the WB2 upgrade, as it allows you to have the best of both worlds without any incompatibilities. Again it is recommended that an Authorized *Commodore* Service Centre perform this upgrade.

Although somewhat brief, I hope this article has given a better understanding of the major chip set upgrades available for the *Amiga 500* and *B2000* series of computers. I would appreciate any feedback, constructive criticism (for example is this in-depth enough?), and ideas for any future articles, this is your magazine so please write and tell me what you would like to see in the way of hardware explanation or support.

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Dear Zipper

The "Dear Zipper" column will take a light hearted look at the world of the Amiga and be a great boost to Zippers ego. I still would like to be able to help out the little person who's having a bad time with their *Amiga*, both hardware and software. Through this column it will also be possible to get a "Fair Go" from the suppliers of *Amiga* products. Although I may not be able to solve all your problems, at least you can warn other people through this column about the troubles that you have encountered.

Another advantage of this column is to find out about gossip and what's new in the *Amiga* world and for you to tell me the juicy gossip you hear.

The future direction of the column is to ensure that you get an informative yet lighthearted point of view (although I will be mostly biased to my point of view, but hey, I get to do the writing). Also it is important to me that I help at least one person in New Zealand, even if its just how to turn on an *Amiga 600*.

It is important that you know a little about "Zipper" who will be your guiding force in future issues. Born a long time ago way before *Amiga*'s were first plugged into the power socket I was first introduced to the world of the *Commodore* when I purchased my very own *Commodore 64* and WOW! what a machine that was. From there I graduated to an *Amiga 1000* and from there on to an *Amiga 2500*. You could say that I have done the lot! I've built ram cards, soldered my way into many a mess, built myself an accelerator and managed to damage 80% of the motherboard at the sametime.

In between playing with my *Amiga* I've been employed as a programmer on those horrible blue machines where one has to use a keyboard rather than a nice little mouse. Above all there remained a love for the Amiga and its operating system. It was about this time when an extremely nice man from **NZAmiga Magazine** made me an offer I couldn't refuse (if I want to be able to keep my kneecaps). So here I am ready to solve your every little problem.

Being the first issue, I don't yet have the cult following I expect by issue two, so this, my first column has questions written to me by people around the office! (All questions are certified authentic by Zipper(c)).

Dear Zipper,

How can I become a really groovy Amiga user like you.

Signed
Eager Fan.
Birkenhead, Auckland

Zippers Reply:
Well I get a lot of letters like this and have devised the following list of ESSENTIAL items for you to have in order to at least be nearly as cool as me: An "I Love Zipper" tee shirt. An "I Love Zipper" mouse mat and mouse. An "I Love Zipper" badge and key ring. Finally a big supply of "I Love Zipper" chocolate bars.
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Does this magazine come in a disk format. So that I can use my Amiga to read it ??

Signed
B. Tallstory
Drury, Auckland

Zippers Reply:
Sure you can, by folding the magazine into quarters and then quarters again. After that insert into your disk drive. Please note that you do require large amounts of ram, over 8 meg, in order to read the entire information stored on the disk. This is truly a versatile publication.

Well, in order for me to keep on writing this column and for this column to appear in the next issue of **NZAmiga Magazine** (the editor made me say that) there is a great need for you the reader to support this column and me. By just writing in with questions, letters of praise, comments about problems with your computer, problems with suppliers, letters of praise, etc. This will ensure that "yours truly" gets his weekly wage and your problems get solved by an expert (or at least in my own mind!)

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P.S The letters start next issue (if I get any).

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Please send us your full name, postal address, contact phone (home, bus, fax, modem) and your age. We would also like as much information as possible about yourself and your Amiga. This will help us cater for more of your needs in this magazine. Below are some of things that we would like information about. Please include brand name and model of any products that you own.

1. How long have you had an Amiga? Amiga model? Monitor? RAM? Video? 68020/030/040? Modem? Printer? Genlock? WB version? Music/sound? Any other hardware or software? Other computers? Which other Amiga magazines do you like to read?

2. I would like to see articles on . . .? I am able and willing to write articles on . . .? See section below.

3. I would like to see product reviews on. .? Are you using any product that you are pleased with or would recommend to others? Why? Purchased in NZ? (If you cannot remember where you purchased this item or would rather not say then put as much info as you can e.g. dealer, Auckland or mail order). Any products you are disappointed with or would not recommend? Why? Purchased in NZ?

4. What is your opinion of Amiga dealers? And Commodore? Please be as specific (i.e. dealer name, location, date, product or inquiry) as practical.. What would you like to see more of in NZ? Shows? Mail order? More dealers?

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I can contribute to NZAM. Send details as follows:

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Which subjects do you wish to write about? Once only article or regular writer? How are you qualified to write about this? Have you had previous writing experience? Are you employed in an Amiga related area?

Please enclose a letter giving brief idea of the article/s you would write. All articles submitted must be an ASCII file plus a hard copy. Disks returned if you provide SSAE.

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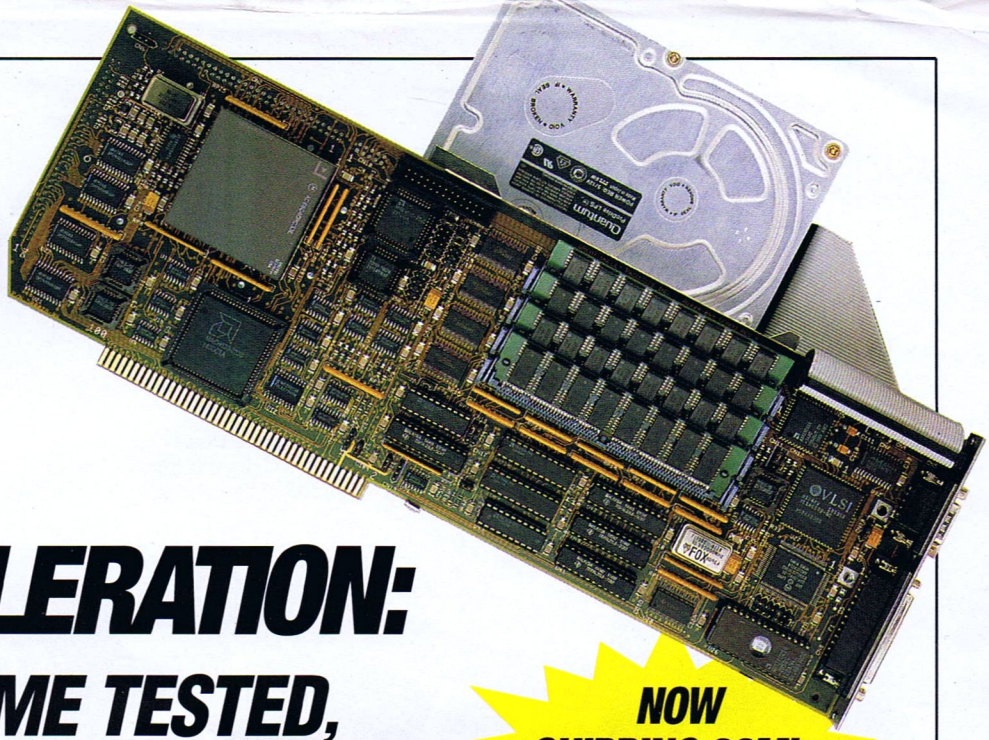

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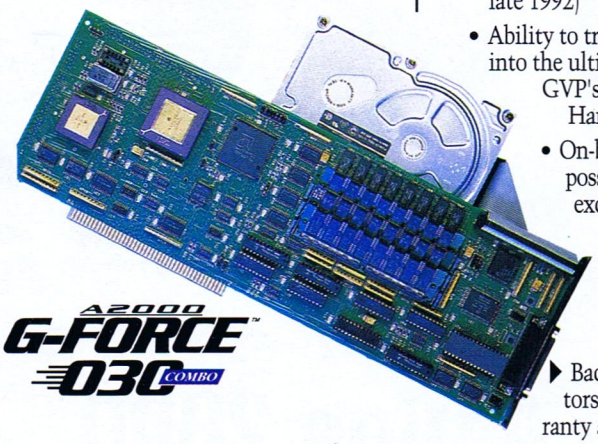

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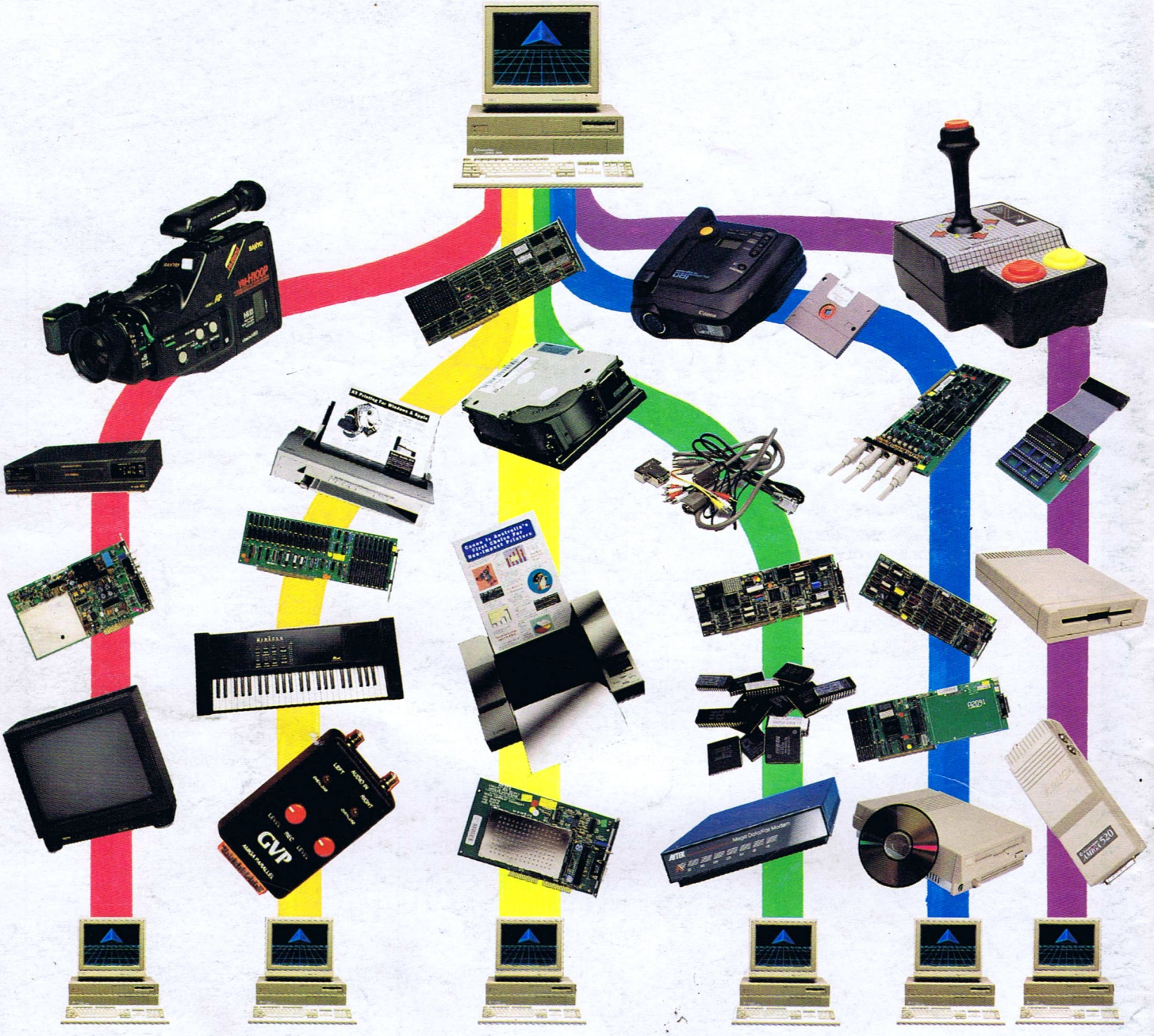

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